A story is told of a now famous man who, as a young boy, called on the president of a large bank and asked him for a job. As he was leaving he stopped to pick up a pin, and the banker, observing, said "That boy will go far." Unfortunately, no one has yet told us whether or not the boy got the job he wanted. We would be interested in knowing. We do know that he is now extremely successful.

Yet in these times if one should stop to pick up a pin he would be laughed at for his superstition,—or chided for his Scottish tendencies. In fact we can think of several men who would refuse to employ any individual so concerned with trifles. The tempo of the age seems to be toward magnitude, no matter how unsuited it may be to individualism.

We prefer to strike a balance through a parody: Take care of the important details and the dividends will take care of themselves.

—o—

WE have another story, closer to many of our readers' own businesses. The president of one of the larger molding plants became convinced that he was wasting a lot of valuable time through overattention to minor details. He therefore had one of his men (a lesser executive), tag around after him for two days taking notes on the number of times he, the busy executive stooped to the attention of lesser, unimportant matters—such as picking up pins, we suppose. The result, somewhat simplified, was that almost two-thirds of his time had been spent doing things other men on his staff could have done. This is a discerning analysis, that could be applied to most every business man. Only one thing was forgotten—the wasted time of the man who made the notes:

Draw your own moral. We absolutely refuse to.

The Publishers.

PLASTICS & MOLDED PRODUCTS

REG. U. S. PAT. OFFICE

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 6 FEBRUARY, 1930 No. 2

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Carl Marx, B. Ch., Editor

Nicholas Klein, Ch. E., Editor, Molded Products

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A. C. Blackall, British Correspondent Heinrich Prehn, German Correspondent

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Publication Office: Washington, N. J.

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Aladdinite

1St

in United States

Aladdinite was the first casein plastic to be manufactured in this country.

In Aladdinite you have a strong, durable, workable material that is **INEXPENSIVE, NON-INFLAMMABLE** and **SANITARY.**

It machines easily because it is made from the finest quality of imported casein.

The uses of Aladdinite are unlimited, particularly being supplied in the button industry, in radio, for novelties, fountain pens, pencils, cigarette holders, beads and combs.

Aladdinite comes in sheets and rods—in all colors, either solid or mottled, and such pretty effects as buffalo horn and tortoise shell. It takes a beautiful finish readily.

Aladdinite may be molded in a variety of pleasing shapes, retaining all the beauty that is characteristic of sheet and rod Aladdinite.

If you are interested in component parts made from Aladdinite, we shall gladly refer you to reputable manufacturers fabricating it.

Insist on Aladdinite, the original American material.

Aladdinite Co. Inc.

ORANGE, N. J.

When writing the Aladdinite Company, Inc., please mention *Plastics*

PLASTICS

(Reg. U. S. Pat. Off.)

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 6 FEBRUARY, 1930 No. 2

Disaster Teaches Valuable Lessons

Extensive report on causes of Cleveland Hospital Film Fire includes many suggestions for the safe handling of cellulose nitrate film and products.

By a Board of the Chemical Warfare Service

OUR readers undoubtedly remember the terrible disaster that occurred in the Cleveland Hospital Clinic, Cleveland, Ohio, on the morning of May 15, 1929, when a fire, originating in the X-ray film storage room of that hospital took the lives of 125 patients, nurses and doctors, who were rapidly overcome by the highly toxic fumes developed by the decomposition of the cellulose nitrate film of which the X-ray films were composed.

Experience is alleged to be the best teacher of all, but unless we are willing also to learn from the experience of others, little progress will be made.

Pyroxylin products will burn—but they need not do so if reason prevails in their use and storage.

Board Reports

Numerous investigations followed the fire, but the most interesting, unbiased, and complete one was that undertaken by a Board of the Chemical Warfare Service of the United States Army. This board, consisting of Commander D. C. Walton, U. S. N.; Maj. A. M. Prentiss, C. W. S.; Maj. E. S. Linthicum, M. C.; Dr. J. E. Mills and Mr. H. C. Knight has recently issued a 104 page detailed report on all phases of this disaster. No one interested in cellulose nitrate either as film, explosives or molded materials should be without a copy of this report, as only by giving it the widest possible publicity can the valuable recommendations therein contained be of the full value that is due them.

Causes of Fire

The board's report deals with the causes and effects of cellulose nitrate X-ray film fires, with particular reference to the burning or decomposition of 8,500 pounds of these films in the storage room of the Cleveland Clinic on May 15, 1929. The results of this investigation show that the many deaths caused by the Cleveland disaster were produced by poisonous gases (carbon monoxide and "nitrous fumes") which are given off by burning X-ray films. These gases are not war gases. The same gases are given off in the burning of other nitrocellulose products, such as celluloid, nitrocellulose lacquers, smokeless powder, etc., all of which constitute a similar danger in case of fires.

Products of Combustion

The gaseous products given off by burning X-ray films vary in their composition with the conditions under which the fire or decomposition takes place. If films are ignited by a flame in the open air they will burn briskly with the production of comparatively small amounts of poisonous gases.

Another type of burning may be initiated by merely heating the film, as by a lighted cigarette, electric-light bulb, hot steam pipe, etc. In this type there is no flame, but evolution of large volumes of brownish fumes occurs. This decomposition proceeds more or less rapid-

ly, and may even cause the film to burst into flame, depending on the mass of the film, degree of confinement, and other factors.

The fumes from this type of decomposition contain large percentages of carbon monoxide and nitrous fumes, or higher oxides of nitrogen. Carbon monoxide, if breathed in lethal concentrations, causes almost instant death. Nitrous fumes may cause immediate deaths or delayed deaths, sometimes complicated by lung inflammation and pneumonia.

The gases given off when mixed with air are explosive (as well as poisonous) and, if ignited, may cause explosions which may be more or less violent.

Ignition from Electric Lights

In the present investigation, it was ascertained that X-ray films can be ignited by coming into contact with a hot steam pipe, with an electric-light bulb, or, in general, by any source of heat that will raise the temperature of the film above 100° C. for a considerable length of time, or at higher temperatures for correspondingly shorter periods of time.

On the other hand, when one-half ton of X-ray films was ignited in an iron vault equipped with an automatic sprinkler system, only about 5 per cent of the films were destroyed by fire.

Gas masks will not always give adequate protection for rescue work in case of a film fire, due to the high concentration of toxic gases which may be encountered and the possibility that there may not be sufficient oxygen in the atmosphere to support life. An "oxygen helmet" is the only certain protection under such circumstances.

Extensive experiments were made to determine the quantities of poisonous gases given off by decomposing X-ray films under various conditions and also the exact quantities of these gases necessary to kill rats and rabbits. In this manner it was shown that the amount of X-ray films burned in the Cleveland Clinic might easily have produced sufficient concentrations of carbon monoxide and "nitrous fumes" to cause the deaths reported.

Storage Precautions

The nature of film fires, and the poisonous properties of the gases coming from them point to the proper precautions for storage of films to prevent a recurrence of disasters similar to that at Cleveland.

The precautions which suggest themselves as most obvious and important are:

Light and Heat

1. Owing to the sensitiveness of all nitrocellulose products to heat, films should be stored in a cool, dry, fireproof room. Lighting should be by overhead bowl lights and should be sufficient to light the entire room. No sockets should be provided for extension cords. If it is necessary to install heat it should be by hot water or low-pressure steam. The radiator should be located in a portion of the room entirely free from film storage and should be fully protected by guards and the pipes should enter the room at the point occupied by the radiator.

Good Ventilation

2. Owing to the large volumes of poisonous gases generated in film fires, film storage rooms should be so located that gases generated in them could not be disseminated to other parts of a large building. They should be provided with sufficient exits so that any gases generated would have ready access to the open air. This may be effected by the use of overbalanced vents that are self-opening and actuated by thermal control releasing means. Efficient and tight-fitting fire doors should be provided.

Store It Alone

3. Owing to the sensitiveness of nitrocellulose products to reaction with other substances the film storage room should be reserved for the storage of films only. No other material should be allowed to come into contact with films. It is self-evident that the exclusion of oily or greasy rags, mops, clothing, etc., from a film storage room should be rigidly enforced since these materials frequently cause fires by spontaneous ignition.

Quenching the Fire

4. Owing to the exothermic nature of the decomposition reaction in film fires, provision should be made for rapidly cooling down the entire room in case a fire starts. This may be done by a multiple unit sprinkling system which delivers a large volume of water. The valves should be closed by an easily fusible alloy which is melted on the appearance of fire in the room. It should be remembered, however, that when a fire gets a good start in a large amount of films (several tons) it is almost impossible to put it out owing to the fact that films contain enough oxygen in themselves to maintain combustion. In case of failure to actually extinguish a film fire copious volumes of water from overhead sprinklers serve at least two other useful purposes. One of these is that the gases from the burning films are kept cooled down, their volume is reduced, and the danger of explosion is minimized. Another is that the poisonous brown oxides of nitrogen are soluble in water and are removed from the gases of combustion by the water. It has been demonstrated by actual burning experiments carried out by the Eastman Kodak Co. that many film fires are actually extinguished by an efficient sprinkler system which gets into action early. In all cases the loss and damage were greatly reduced by the use of sprinklers.

General Conclusions

The board concludes that:

1. Fires from nitrocellulose film have been of frequent occurrence in the past.

2. Records of film fires show that casualties have resulted from toxic gas poisoning, these casualties varying from slight incapacity to death.

3. Such fires may be started

by a direct flame, glowing cigarette, hot wire, hot steam pipe, electric-light bulb, or, in general, by any source of heat which will raise the temperature of the film above 100° C.

4. No ignition resulted from contact of films with pieces of hot asbestos lagging from steam pipes carrying steam pressures up to at least 135 pounds per square inch, nor from an impinging jet of live steam from a pipe up to the same pressure continued for 15 minutes.

Effect of Storage

5. Storage of films over long periods of time at somewhat elevated temperatures makes the film more sensitive to decomposition.

6. The storage of films in paper envelopes materially decreases the rate of burning and the maximum temperature obtained. It also tends to produce a flameless combustion, and decreases the percentage of CO.

7. Depending upon the manner in which decomposition is initiated the combustion may be of two types—a flameless combustion giving rise to large volumes of dense smoke and fumes; or a flaming combustion which in the presence of an adequate supply of oxygen gives rise to very little smoke or fumes. Flameless combustion is more productive of deadly gases than flaming of the films.

Speed of Decomposition

8. The rapidity of decomposition above a critical temperature is extremely rapid, approaching the rate of combustion of guncotton. Small amounts of cellulose-nitrate films will decompose at 130° C. in a few hours, and at 160° C. in about one minute. Large amounts will decompose at lower temperatures.

9. The decomposition, once started, is accelerated by the catalytic action of the products of decomposition. The rise of temperature due to decomposition may itself cause ignition of the film and of the gaseous products given off.

10. There is sufficient oxygen in the composition of the film itself to support combustion after the same has begun.

11. The gases formed by the decomposition are inflammable and when mixed with a suitable proportion of air are explosive.

12. The volume of gases given off by burning film is from 4 to 5 cubic feet per pound of film calculated to ordinary temperatures and pressures. Some investigators have found as high as 9.4 cubic feet per pound of film.

Nature and Effect of the Gases

13. The principal toxic gases resulting from nitrocellulose film are carbon monoxide and "nitrous fumes." By "nitrous fumes" are meant the poisonous oxides of nitrogen NO, NO_2, and N_2O_4, the proportions of which vary with the conditions accompanying the decomposition. The percentage of other toxic gases present is considered negligible.

14. In general, when cellulose-nitrate films are decomposed with flameless combustion in a vented chamber in the ratio of 2 pounds of film per cubic foot of air space, the following constituents are found in the amounts given. (See p. 82.) None of these gases have found use in warfare as toxic agents. A small amount of hydrocyanic acid is formed but the amount is negligible compared to the other toxic gases present.

15. Experimental data indicate that casualties at Cleveland could be classified as follows:

(1) Immediate deaths due to carbon monoxide, lack of oxygen. and nitrous fumes.

(2) Cases brought out unconscious from carbon monoxide poisoning that later recovered, only to develop lung oedema later from nitrous fumes.

(3) Cases that seemed but little affected at the time but later developed lung oedema from nitrous fumes.

(4) Sequelae and complications of the above. The nitrous fumes, including NO, NO_2, and N_2O_4, produce many of the physiological effects encountered in the delayed deaths.

16. The toxicity of nitrous fumes is such that inhalation of 0.6 to 1 milligram per liter of air (0.029—0.049 per cent by volume, calculated as NO_2) quickly causes death. Inhalation of even smaller quantities may cause delayed death. Carbon monoxide can not be breathed without danger in concentrations of more than 12.5 milligrams per liter (1 per cent by volume) for a period of more than four to six minutes. Camphor vapors have no toxic effects on rats up to a concentration of 30 milligrams per liter (0.47 per cent by volume).

Extinguishing

17. Film fires may be extinguished by adequate automatic sprinklers, released at 155° F., and the amount of toxic gases liberated is materially reduced by the operation of automatic sprinklers.

18. Water-soaked film which has been in a vault and exposed to the action of automatic sprinklers can be recovered, washed, and is still of use as a case record. Used film no longer necessary as a record has a salvage value if returned to the manufacturers.

19. The size of vent for X-ray film storage rooms recommended by the National Fire Protection Association, of 140 square inches per 1,000 pounds of film is sufficient to carry off the fumes, and, in the absence of explosions, without the development of undue pressures.

20. Too much reliance should not be placed on the fireman's canister type of gas mask in film fires due to the high concentration of toxic gases which may be encountered and the possibility that there may not be enough oxygen to support life. Under such circumstances the oxygen helmet is the only certain protection.

21. In two experiments, animals placed outside the chamber

(*Continued on page 93*)

The Cellulose Acetate Plastics

Steadily forging to the front, and capable of many applications, these products have an interesting history and have engaged the serious attention of many workers and inventors

By Joseph Rossman

STARTING in the January issue, a short history of the efforts of inventors to render cellulose acetate thermoplastic, brought the article down to the discussion of

Thermoplastic Cellulose Acetate

An interesting plastic is described in patent No. 1,185,074 dated May 30, 1916 to Eichengrun applicable to a large field of uses for which hitherto rubber, celluloid, soft metal or the like have been employed, as for instance for the production of packing material, electric insulating material, heat insulating and the like materials. The plastic can further be used for the production of piano keys, hollow bodies, receptacles, hoods and coverings, or platings for wood, metal, paper and the like foundations, or the material may be blown into the shape of dolls, animals and the like toys.

Plasticizers Used

The process is carried out as follows: One kilo acetyl cellulose is mixed with 300 grams acetyl methyl anilid and 300 grams of ethylester of lactic acid, one kilo alcohol and one kilo of benzene is added and the whole heated to 70 degrees centigrade. After solution 2 kilos zinc white are admixed and the resulting viscous mass is poured out onto a flat surface. The mass solidifies at once to a homogeneous sheet or plate, which when quite dry assumes the form of a solid celluloid-like material of great plasticity.

Instead of the mixture mentioned, cold acting solvents may be employed, the troublesome formation of bubbles during the evaporation of acetyl cellulose solutions being prevented by the presence of the large amount of filling material, and thick homogeneous plates also can be produced by means of easily volatile solutions such as acetone. In the same manner the filling material can be worked directly with the acetate and the admixtures with or without the presence of solvents, into a homogeneous mass, by kneading while hot, and if desired under pressure, in this case because the excessive softening action of the quantity of admixtures required for the production of such a mass is counteracted by the amount of the filling material. Finely powdered substances of all kinds, such as mineral-, metal-, vegetable powders graphite, lamp black and the like, can be employed as filling materials.

The writer of this article is now so well known to our readers, that he needs no introduction. This review is complete as to American patents. We hope to supplement it before long with one of the foreign patents as well.

Our aim is to make PLASTICS a complete working library of the art of producing and using plastic materials.

The Elimination of Seasoning

In the manufacture of sheet, slabs, blocks, rods, tubes, rings, electric insulating parts and many other articles the cellulose acetate, with or without pigments or other additions, is incorporated with volatile solvents and with plasticizing or softening agents. Thus, after the plastic materials or articles have been manufactured by working up the ingredients in kneading or mixing machines, then on the rollers and finally in the presses and sheet cutters or in extrusion dies, molds and so forth, they contain quantities of low boiling solvents and require to be "seasoned" in order to dry out the low boiling solvents. The thicker the sheets, rods, tubes or other articles the longer is the period of seasoning required, so that this may range from a few days in the case of thin sheets cut from pressed blocks, up to several months for thick sheets, tubes, rods and molded articles.

The invention of patent No. 1,528,291 dated Mar. 3, 1925 to Dreyfus aims to dispense with the period of seasoning.

The cellulose acetate in an air dried state, or heat dried state, is mixed or kneaded under heat with the plasticising or softening agent or agents, in absence of volatile solvents and of diluents capable of being driven off by the heat, the cellulose acetate melting together with the plasticising or softening agents or agents to a plastic or liquid state under the heat. The mixing and heating may be performed in a vacuum if desired.

The heating may be applied during a portion or the whole of the mixing or kneading op-

eration, the mass being heated to a much higher temperature than that of 50°—70°C. which is usual in the manufacture of ordinary nitrocellulose celluloid; for example one may heat to 90°-150° C. or even higher.

Pigments, filling substances or other usual or suitable additions may of course be incorporated. Likewise there may be incorporated with the mass in the mixing or kneading apparatus any known agents for neutralizing traces of acid, such for example as urea, mono-di- or trimethyl urea or mono-, di- or triethyl urea.

The material removed from the mixing or kneading apparatus may be further worked up on heated rollers in the known way, or it may be taken direct to the presses for pressing into blocks suitable for cutting into sheets, or to molds for molding or extrusion, or be otherwise articles as desired.

Can Be Cast

The plastic mass from the kneading or mixing apparatus, after having been worked upon the rollers or not, may be taken to presses or molds, for example block presses of the usual nature, or molds of any suitable kind and heated up therein under pressure to a much higher temperature than is usually employed for pressing or molding ordinary celluloid to about 90°-150° C. or higher, so that the cellulose acetate is melted down in the plasticising or softening agents to form a plastic or more or less fluid mass which solidifies again on cooling.

Pressure may be dispensed with and the mass from the kneaders or mixers or from the rollers may be simply melted, and cast or run, and allowed to set by cooling.

Blocks or slabs pressed, molded or cast as before mentioned may be cut into sheets while the mass is still hot or after cooling.

The melted masses may be run on to the surfaces to form sheets, films, or the like, or extruded through dies to form rods, tubes or other articles.

The following is one example showing how the process may be carried out: 100 parts of finely ground cellulose acetate are worked up in a kneading apparatus with about 30 to 40 parts of mixed isomeric xylene-o-monomethyl sulphonamides, with or without addition of about 6 to 8 parts of triphenylphosphate or tricresylphosphate, the mass being gradually heated to about 100°-150° during the kneading operation, to melt the cellulose acetate together with the plasticising material. A vacuum may be applied during the heating if desired.

Pigments or dyes or other additions may be incorporated with the materials in the example according to requirement.

The masses removed from the kneading apparatus, and while still hot, so as to avoid requirement for heating up again, may be worked up on heated rollers in a way similar to that practised in the celluloid manufacture, the rollers being however heated to higher temperatures than those usual in the celluloid manufacture, e. g. to 90°-100° C. or higher. Or, with or without working on rollers, the masses may be pressed into blocks or be otherwise molded, extruded, run or cast as hereinbefore indicated, according to requirement and the character of the goods to be produced.

By means of the invention articles and objects of any section, contour and thickness may be produced, whether solid or hollow, for example sheets, slabs, blocks, rods, tubes, rings, electric insulating parts or any other articles such as are commonly produced in celluloid, vulcanite, ebonite and so forth. They may be made transparent, opaque, plain or colored, and with any desired pattern or mottling, such for instance as imitation tortoiseshell and so forth, according as suitable additions are employed in the masses or not.

Abstracts

The following abstracts of U. S. patents will give the reader a survey of the many proposed methods for making cellulose acetate plastics.

1. Eichengrun and Becker 738,-533. Sept. 8, 1903.

A plastic composition consisting of cellulose acetate and camphor.

2. Walker 774,713. Nov. 9, 1904.

Cellulose acetate is dissolved in chloroform with the addition of thymol and the usual fillers as zinc oxid.

3. Walker 774,714. Nov. 8, 1904.

Cellulose acetate combined with chloroform, thymol, and castor oil.

4. Collardon 830,493. Sept. 11, 1906.

Plastics made from casein and cellulose acetate.

5. Aylsworth 962,877. June 28, 1910.

Cellulose acetate is mixed with halogenized fatty acids.

6. Eichengrun 1,015,155. Jan. 16, 1912.

Aplastic mass is obtained from cellulose acetate, acetate of glycerin, alcohol and benzene.

7. Eichengrun 1,015,156. Jan. 16, 1912.

A plastic comprising cellulose acetate, an alcohol, an aromatic hydrocarbon and camphor or camphor substitutes.

8. Lindsay 1,027,486. May 28, 1912.

A composition consisting of acetyl cellulose dissolved in a mixture of acetodichlorhydrin and alcohol in admixture with other solvents and coloring matter and inert substances.

9. Lindsay 1,027,615. May 28, 1912.

A composition consisting of a solution of acetyl cellulose in ethyl-acetochlorhydrin in admixture with other solvents.

10. Lindsay 1,027,616. May 28, 1912.

A composition consisting of a solution of acetyl cellulose in a mixture of pentochlorethane alcohol (ethyl or methyl), combined with other solvents and inert or coloring matters.

11. Lindsay 1,042,112. Oct. 15, 1912.

A composition consisting of acetyl cellulose dissolved in a mixture of pentachlorethane and methyl alcohol.

The short abstracts of these American patents will continue in March.

Vinyl Ester Resins Now Commercially Available

Variety of products suitable both for molding and as bases for lacquers announced. Light colors are feature

THE vinyl esters are capable of polymerization to form resinous materials. Considerable work has been done on these in recent years, but it is only within the past few months that any of these products have been commercially available in quantities that enable their use for industrial applications.

Vinylite

A new brand of these compounds, collectively designated by the trade-marked term VINYLITE, has appeared on the American market. It may be stated right at the start that these compounds do not become insoluble and infusible on heating, but are very suitable for molding such compositions as will not be subjected to very high temperatures. In many of its characteristics the Vinylite resins resemble shellac, with the exception that they are either glass-clear or at least an opaque white, depending upon the grade.

The producers of these resins are not yet ready to disclose the precise processes used in their manufacture, which, in view of the fact that patent applications thereon are still pending, is excusible. However considerable valuable information as to their use, both as a molding composition, and as an ingredient in lacquers, is available, and is herewith reproduced by permission of the manufacturers.—*

The following types of Vinylite are now available:

Vinylite A—Colorless glassy resin, soften at 50-100° C., soluble in acetone, alcohols, ketones, esters, aromatic hydrocarbons, etc. Uses: Metal lacquers. adhesive, transparent molding resin.

The modern list of available molding resins is growing quite formidable, but every new product has some definite peculiarity that adapts it for some special use; so instead of really competing the new products supplement each other—and extend the field of applications of plastics and molded products.

Vinylite N (solution)—Supplied in solution containing 50% solids or less. Compatible with nitrocellulose. Films of this resin are unaffected by water, brine, etc. The resin is soluble in aromatic hydrocarbons, ketones, esters. Insoluble in gasoline and alcohol. Uses: May be blended with nitrocellulose solutions to increase resin content; impregnating cellular material, etc.

Vinylite 80 (solution)—Supplied in solution containing 50% solids or less. Not compatible with nitrocellulose. Films of this resin are impervious to water, brine and 20% solutions of acid or alkali. Soluble in aromatic hydrocarbons, esters and ketones. Insoluble in gasoline and alcohol. Uses: Especially suited for surface coating work and moisture proofing cellular material such as wall board, gypsum, plaster and fabrics.

Vinylite 80-C—White opaque resin. Soluble in esters, ketones and the usual nitrocellulose solvents. Insoluble in aromatic hydrocarbons, alcohol and gasoline. Unaffected by water, brine, 20% acids or alkalis. Uses: Same as for Vinylite 80 solution. In addition very satisfactory for molding purposes.

VINYLITE A

General Properties

Vinylite A is a colorless resin supplied either as a solid or dissolved in acetone in concentrations up to 50% solids. It is soluble in alcohols, ketones, esters, glycol ethers and ethers, aromatic hyrocarbons and in such chlorinated compounds as chloroform, ethylene dichloride, etc.

Films of Vinylite A readily transmit ultra-violet light and appear to have remarkable powers of resisting the destructive effect which ultra-violet light has on nitrocellulose. Since Vinylite A is completely compatible with nitrocellulose, useful lacquers have been formulated from a combination of these two materials. As straight Vinylite A films are not wholly impervious to moisture, the incorporation of nitrocellulose is recommended when resistance to water is desired.

Clear Lacquers Containing Vinylite A

As a starting point in formulating clear lacquers for outdoor work, the following formula is recommended for trial:

100 parts Vinylite A (50% solids in acetone)

(*Continued on page 81*)

*Produced by Carbide and Carbon Chemicals Corporation; a unit of the Union Carbide and Carbon Corporation, New York, N. Y.

36 parts wet ½ sec. R. S. Nitrocellulose
15 parts Dibutyl Phthalate
200 parts Solvent

Solvent

70 Toluol (by volume)
15 Ethyl acetate
5 C. D. No. 1 Alcohol
5 Cellosolve
5 Cellosolve Acetate.

This lacquer is of the proper consistency for coating metal in order to prevent tarnishing and is accordingly somewhat less viscous than a pigmented lacquer.

It can be seen that in this formula Vinylite A is present to a considerably greater extent than is usual with the ordinary lacquer resin.

By the introduction of suitable pigments, such as titanox, zinc oxide, Prussian blue, etc., colored lacquers can be produced.

VINYLITE N

General Properties

Vinylite N is supplied as a solution of this resin in toluol and usually contains about 50% solids. Like Vinylite A it is compatible with nitrocellulose but unlike this resin it is impervious to moisture and insoluble in alcohol.

This resin is soluble in aromatic hydrocarbons, ketones, esters, the glycol ethers and esters and chlorinated solvents. It is insoluble in the paraffin hydrocarbons (gasoline) and alcohols.

Vinylite N is particularly suited for use with nitrocellulose, in the formulation of protective coatings and although Vinylite N does not have quite as good adhesion as Vinylite A, it has better resistance to moisture, dilute acid, alkali and salt solutions which makes it more suitable for use when such properties are required.

Vinylite N can be used without nitrocellulose as a protective coating but when this is done, it is advisable to force dry the film. When nitrocellulose is not used in the lacquer, Vinylite 80 is recommended instead of Vinylite N.

For this reason Vinylite N finds its chief use in making combinations Vinylite N-nitrocellulose lacquers. However, it may be used, although somewhat less advantageously, instead of Vinylite 80 for the impregnation of paper, cloth, etc., in order to waterproof these materials or in most of the other uses to which Vinylite 80 may be put.

Clear Vinylite N-Nitrocellulose Lacquer

500 parts 20% ½ sec. R. S. Nitrocellulose in Solvent S-7
189 parts 53% Vinylite N in toluol
20 parts Dibutyl Phthalate
40 parts Ethyl Acetate
500 parts Solvent S-7

Solvent S-7

60 Toluol (by volume)
10 Butanol
10 Ethyl Acetate
10 Cellosolve
10 Cellosolve acetate

Pigmented lacquers can of course also be produced.

VINYLITE 80

General Properties

Vinylite 80 is supplied as a solution of this resin in toluol and usually contains about 50% solids.

Films of this resin are impervious to moisture and are resistant to the corrosive action of fairly concentrated (approximately 20%) acid, alkali and salt solutions. For this reason it finds considerable use as a protective coating.

Vinylite 80 is incompatible with nitrocellulose and accordingly cannot be used with this material. This resin is soluble in aromatic hydrocarbons, ketones and esters including the glycol esters. It is insoluble in paraffin hydrocarbons and alcohols, and finds it chief use as a protective coating and impregnating agent. For these uses it may be used with or without a plasticizer but if flexibility is required the use of a plasticizer is recommended.

Vinylite 80, like Vinylite N has somewhat less adhesion to metal than Vinylite A. For this reason when it is used as a protective coating it is advisable to apply it over a suitable primer. The adhesion of Vinylite 80 films to metal can also be increased by incorporating another suitable resin with the Vinylite.

The choice of properly balanced solvent combinations to be used with Vinylite 80 is important when clear smooth films are desired. This, however, is not as important when the Vinylite 80 is to be used for impregnating cloth, paper, felt, etc.

Vinylite 80 films tend to retain such solvents as toluene and those of higher boiling points. For this reason it is frequently desirable to force dry the films at moderate temperatures. Formulas for lacquers are described by the manufacturers.

This material is also useful for impregnating wood, fiber board, etc.

VINYLITE 80-C

General Characteristics

Vinylite 80-C is a white opaque powder which is soluble in the usual nitrocellulose lacquer solvents. It differs from Vinylite 80 in that it is insoluble in toluol. Vinylite 80-C softens at a somewhat higher temperature than do films of Vinylite 80.

It can be used for formulating lacquers and gives transparent, hard films. However, Vinylite 80-C finds its chief use as a plastic molding compound. In this work it is used much as other molding resins.

Vinylite 80-C Molding Compounds

Vinylite 80-C and such fillers as wood flour, cotton flock, asbestos, ground mica, etc., are best compounded by working them together on heated rolls. For the usual molding mixes about 40% Vinylite 80-C and 60% filler and pigment should be used. In some cases it is advisable to incorporate about 1% aluminum stearate in the mix, in order to facilitate the removal of the molded piece from the die.

Dies for using Vinylite molding powders should be designed for a compression of 2½ to 1 in

(*Continued on page 92*)

The World's Recent Progress in Synthetic Resins

A complete and condensed account of patents from the most important industrial countries

By *Dr. Aladin*

The patents that are listed here are all of recent origin and disclose the progress realized throughout the civilized world in this field. The dates, except in case of U. S. patents, are those of application. There will be a total of over 450 patents in this review. Publication began in April, 1929.

(*Continued from January Issue*)

X. Resins from Aldehydes.

a. From Acetaldehyde

Serial No.	Patent Number and Date	Inventor or Assignee	Title of Invention	Subject Matter of Invention
240	U. S. P. 1,596,971	W. O. Herrmann and H. Deutsch (Konsortium für elektrochemische Industrie)	Preparation of water-insoluble resinous condensation products from aldehydes.	Shellac-like products are obtained from the condensation products of aldehydes that have been treated with alkalies, by subjecting the same, in finely divided condition, to water and an acid such ac acetic acid. The products are afterwards remelted at 200° C.
241	U. S. P. 1,600,113	W. O. Herrmann and H. Deutsch (Kons. f. elektrochem.) Industrie)	Preparation of aldehyde resins.	Aldehydes, or their lower condensation products such as metaldehyde, paraldehyde, crontonaldehyde etc., are subjected to, treatment with acids while heated; yielding tough viscous condensation products that may be employed as substitutes for shellac etc.
242	U. S. P. 1,625,852	H. Deutsch and W. O. Herrmann (Konsortium f. elektrochem. Industrie)	Preparation of lynoxyn-like masses.	Aldehyde resins receive an addition of oxy-acids (which may have also been introduced during their formation). Further materials added comprise resins, waxes, China wood oil, hydrogenated phenols or naphthalenes. The preferred oxy-acids comprise ricinolic acid, dioxy-stearic acid, phenylacetic acid, grape-seed oil fatty acid, or their esters.
243	Ger. P. 448,427 Frdl. XV, 1180	I. G. Farbenindustrie A. G. (M. Paquin, A. Voss and H. Wohlers)	Preparation of artificial resins.	Resins obtained by the condensation of metaldehyde, crotonaldehyde, aldol etc. are treated with halgons. The treatment may be effected either in the dry state or in the presence of solvents or diluents.

b. From Acrolein

(no new patents)

c. From Furfural

244	U. S. P. 1,665,233	John P. Trickey and Carl S. Miner (Quaker Oats Co.)	Preparation of furfural resins.	Furfural is heated with about 1% of an anhydrous metallic salt such as aluminum chloride, ferric chloride, lead acetate, iron fuorate (pyromucate) etc., preferably under pressure. The soluble and fusible resin obtained, may, after washing be hardened by further heating.
245	U. S. P. 1,665,234	John P. Trickey and Carl S. Miner (Quaker Oats Co.)	Preparation of furfural resins.	Furfural is heated with finely divided metals such as iron, nickel, lead, magnesium, zinc, tin) under pressure, at temperatures ranging from 163° to 170° C. After washing the resins formed free from the catalysts employed, they may be hardened by further heating.

Serial No.	Patent Number and Date	Inventor or Assignee	Invention Title of	Subject Matter of Invention
246	U. S. P. 1,665,235	John P. Trickey and Carl S. Miner (Quaker Oats Co.)	Preparation of resins from furfuralcohol.	Furfuralcohol is treated, (if desired in the presence of water) with hydrochloric acid, whereby, at about 80° C., resinification takes place. After washing with alkalies, the resin can be converted by further heating into the insoluble and infusible stages.
247	U. S. P. 1,665,236	John P. Trickey and Carl S. Miner (Quaker Oats Co.)	Preparation of furane derivatives.	100 parts of furfural together with 80 parts of a 25% solution of sodium hydroxide are introduced at ordinary temperatures into a mixture of furfuralcohol and sodium pyromucate. Later the mixture is made acid to Congo-red by means of sulfuric acid, filtered from the thus precipitated sodium sulfate, and the residual mixture then heated to 80° C., whereby resinification takes place.
248	U. S. P. 1,665,237	John P. Trickey and Carl S. Miner (Quaker Oats Co.)	Preparation of resinous substances.	A mixture of equal parts of furfural and of furalcohol (which may also be obtained by treating furfural with insufficient amounts of sodium hydroxide and alkali pyroxmucate (see No. 247) is heated, in the presence of water, with 1% of hydrochloric acid to 80° C., whereby resinification takes place. The resin is separated and washed with alkalies.
249	U. S. P. 1,639,957	C. O. North (Rubber Service Laboratories Co.)	Preparation of aldehyde reaction products of aldehyde derivatives of Schiff's bases.	For example an acetaldehyde derivative of a condensation product of acetaldehyde, aniline and formaldehyde (or another aldehyde) is further condensed by heating; the water formed being removed by a vacuum treatment, leaving a hard resin.
250	U. S. P. 1,640,899	I. G. Farbenindustrie A.-G.	Resinous condensation products from croton-aldehyde and aromatic amines.	See Brit. P. 270,433 (No. 258)
251	U. S. P. 1,659,151	C. O. North (Rubber Service Laboratories Co.)	Preparation of derivatives of aldehyde-amine condensation products.	The aldehyde derivative of a Schiff base, made in accordance with U. S. P. 1,659,152 (No. 252) is condensed while hot with formaldehyde, whereby a hard glass-like resin is obtained.
252	U. S. P. 1,659,152	C. O. North (Rubber Service Laboratories Co.)	Preparation of derivatives of aldehyde-amine condensation products.	Acetaldehyde vapor is conducted into aniline or toluidine, the condensation being continued until a final product is obtained that contains 3 mols of acetaldehyde to 2 mols of aniline.
253	German P. 451,734 Frdl. XV, 1183	I. G. Farbenindustrie A.-G. (W. Kropp)	Preparation of resinous condensation products from aromatic amines and croton-aldehyde.	The condensation product obtained from crotonaldehyde and betanaphthylamine is a resin melting at about 70° C., and is soluble in benzene, acetone and linseed oil. The resins from crotonaldehyde and aniline and/or ortho-toluidine are insoluble in water, soluble in ether, acetic esters, solvent naphtha, turpentine and linseed oil. See also British Patent 270,433 (No. 258) and French Patent 612,758 (No. 264).
254	German P. 452,009	I. G. Farbenindustrie A.-G. W. Hildebrand	Preparation of resinous condensation products from aromatic amines and formaldehyde	An aromatic amine such as aniline, ortho-toluidine, chlorotoluidines, naphthylamines etc., is condensed with 1 mol of formaldehyde in presence of water and water-soluble solvents for the amine, but without the use of other condensing agents. The resin that is formed is freed from water and other volatile matter by heating in vacuo.

Serial No.	Patent Number and Date	Inventor or Assignee	Invention Title of	Subject Matter of Invention
255	German P. 453,276	I. G. Farbenindustrie A.-G. W. Hildebrand	Preparation of resinous condensation products from aromatic amines and formaldehyde. (Addition to 452,009.)	In general the method described in the main patent is followed, but a small amount of a salt of the amine employed is added, even though it be merely dissolved in water, 1½ the usual amount of formaldehyde is used in this case.
256	Brit. P. 264,674	I. G. Farbenindustrie A.-G.	Preparation of condensation products from substituted acroleines and aromatic amines.	alpha-beta-substituted acroleins, such as for example alpha-ethyl-beta-propylacrolein (obtained from normal butyl aldehyde) are condensed without the use of catalysts with aromatic amines such as aniline. No solvents are employed. The water formed is removed and the residue heated for some time in vacuo. The products are oily in nature.
257	Brit. P. 266,358	P. Haller and H. Kappeler	Plastic artificial substance.	Cf. Swiss P. 123,515 (No. 268)
258	Brit. P. 270,433	I. G. Farbenindustrie A.-G.	Preparation of resinous condensation products from crotonaldehyde and aromatic amines.	The operation is carried on in the absence of acid condensing agents are slightly elevated temperatures, and with or without the presence of solvents or diluents.
259	Brit. P. 274,155	I. G. Farbenindustrie A.-G.	Preparation of resinous condensation products from aromatic amines and formaldehyde.	Cf. German P. 452,009 (No. 254)
260	Brit. P. 275,725	L. Light	Preparation of aldehyde-amine condensation products.	Equimolecular proportions of a primary amine of the aromatic series and formaldehyde are condensed with the aid of acetic or of hydrochloric acid, forming a yellow to brown low-melting resin which is hardened by heating to 190-200° C., forming eventually a resin that melts at around 70° C.
261	Brit. P. 283,965	Society of Chemical Industry	Preparation of plastic masses.	Aniline and formaldehyde are condensed with acid condensing agents, the product being poured into molds and allowed to harden. It is then treated with dilute sodium hydroxide solution, washed with water and pressed at 150° C under high pressure, whereby the product increases in density.
262	Brit. P. 284,589	Society of Chemical Industry	Preparation of molded products.	See Swiss P. 125,729 (No. 272)
263	French P. 612,306	I. G. Farbenindustrie A.-G.	Preparation of resinous condensation products from aromatic amines and formaldehyde.	See German P. 452,009 (No. 254)
264	French P. 612,758	I. G. Farbenindustrie A.-G.	Preparation of resinous condensation products from aromatic amines and formaldehyde.	See Brit. P. 270,433 (No. 258)
265	French P. 612,785	I. G. Farbenindustrie A.-G.	Preparation of condensation products from substituted acroleines and aromatic amines.	See Brit. P. 264,674 (No. 256)
266	French P. 628,650	P. Haller and H. Kappeler	Preparation of plastic artificial masses.	See Swiss P. 123,515 (No. 268)
267	French P. 644,075	Le Fibre Diamond	Method of preparing artificial resins.	Aromatic or aliphatic amines (such as aniline) are condensed with aliphatic or aromatic aldehydes (such as formaldehyde) in presence of cresols, and the product is treated at 150° C under slight vacuum. A soluble fusible resin is obtained. By heating to 170° C it can be hardened.

This article will continue until all of the over 400 patents have been reviewed.

Characteristics of Electrically Heated Platens for Molding

ELECTRICALLY heated platens for molding plastic materials of a resinous nature such as Bakelite are no recent aids to production moulding. It is only in comparatively recent years however, that the platens, electrically heated, have been manufactured, combining the essential characteristics for molding purposes. It has been realized in practice that not only can electrically heated platens be made to equal the performance of steam platens, but they can outperform steam or gas platens, being more reliable, physically stronger, and the heating inherently more uniform. The ability of the electrically heated platen to operate at elevated temperatures up to 600 or 800 degrees F. is of considerable importance. Another advantage is the ease with which the higher and lower temperatures can be obtained on the same platen, simply by moving the adjusting arm of the control gauge. With steam heated platens, the pressure of the steam determines the temperature of the platen. To lower the temperature, reducing valves must be used and fine adjustments of temperature are very difficult. It is more desirable now than before to be able to vary the temperature of platens because of the introduction of moulding materials requiring both high and low temperatures.

Truing Up Surfaces

Platens should have the required physical qualities and the requisite strength of stand pressures ordinarily met in molding practice. Second, there should be means provided for maintaining true surfaces on the platens. These surfaces should be renewable and capable of being ground and replaced as frequently as may be necessary. The electrical heating equipment should be such that the heating unit is not crushed by the pressure on the platen surface. In other words, the platen itself is self supporting and the heating element, while rigidly held, should not be secured any more firmly when the press is in operation then when it is not.

There seems to be a concensus of opinion that an electrically heated platen is essentially a simple piece of apparatus to make. When it is finished, it should be rugged and compact and the terminal connections brought out in a business-like manner, but to get these results on a platen which will perform satisfactorily (in production) requires the closest attention to mechanical and electrical design. As to the electrical design, the characteristic of even heating and the ease with which the heating element can transmit the heat generated in it are of prime importance. The heating element should be so designed that it can transmit the heat at a very low temperature gradient so that the heating element is never at any time overheated. This temperature gradient is of very great importance when considering the temperature control, but as this matter will be touched on subsequently in this article, it need merely to be stated that the temperature gradient of the heating element to the surface of the platen constitutes a direct help or hindrance in controlling the temperature of the platen.

The ideal heating element should be of such a design that in heat conductivity it approximates the material in the platen, giving the electrically heated platen an advantage over the steam platen, which latter has passages provided for the steam. In dealing with platens in which the heating element is held rigidly between two sections of the platen, the machining of the platen must be very carefully performed. It has been found by experience that this operation cannot be too well done. Each platen is made in two sections, for clamping the heating element, and this construction necessitates bolting these two sections together. Therefore, if the machining is not well done, the heat transmission thru one half or the other may be variable. Unequal heating will set up distortion in the platen itself and also have a tendency to shear the bolts which hold it together.

Current Requirements

In proportioning the energy required per platen, it is soon realized that the useful heat generated does not bear a high relation to efficiency compared with the total heat generated. In other words, the radiation losses tend to absorb most of the electrical energy. This is caused by the fact that the manufacturer and users of the platens are unable to predict very closely the size of the dies which will ultimately be used between the platens. To minimize the heat loss and to arrange for the amount of heat energy for useful work, it has become necessary to make the platens relatively heavier than that of dimensions for the required pressure—so many thousands of pounds per square inch. In other words, the section for the transfer of heat across the platen surface must be relatively high, or otherwise the heat losses will become excessive. By this means, quite a small die can be put between the large platen surfaces and absorb a good deal of the heat energy without excessive loss, as is usual with thin and light platens.

In figuring out the stresses, the writer has frequently observed that a too rigid adherence to the recognized stresses in steel cannot be maintained. This is due to the fact that the

(*Continued on page 95*)

Actual and Proposed Syntheses of Phenol

Production of one of the fundamentally important raw materials for the manufacture of the resinoids

By Isadore S. Melanoff, M. Sc.

CONTINUING and concluding this review from page 31 of the January issue, we find the following additional recent processes:—

U. S. Patent No. 1,245,353. H. S. Kimball (1917). The benzol is first sulfonated as usual and is then neutralized by calcium sulfite which is produced at a later stage of the cyclic process. The evolved sulphur dioxide is employed to decompose the sodium phenolate which has been produced by adding sodium sulfite to the calcium benzol sulfonate. The calcium sulfite which separates out is applied in the neutralization of benzene sulfonic acid.

U. S. Patent No. 1,301,909. F. Cobellis (1919). This invention relates to the production of synthetic phenol and lithopone as a by-product. Benzene-sulfonic acid and sulfuric acid is neutralized with zinc oxide and then mixed with a calculated quantity of barium sulfide.

$2C_6H_5SO_3H+5H_2SO_4+6ZnO—[C_6H_5SO_3]_2Zn+5ZnSO_4+6H_2O$

$[C_6H_5SO_3]_2Zn+5ZnSO_4+BaS—[C_6H_5SO_3]_2Ba+[6ZnS+5BaSO_4]$

Phenol is liberated from barium benzene-sulfonate in a well known method.

U. S. Patent No. 1,308,757. A. C. Houghton (1919). Benzene sulfonic acid is produced with the smallest possible percentage of free sulfuric acid. This mixture is added directly to caustic soda in the fusion pot. The process is simplified by omitting the preliminary step of neutralization, thus:

$C_6H_5SO_3H+3NaOH—C_6H_5ONa+Na_2SO_3+2H_2O$

This concise resume of processes proposed for the synthesis of phenol is of particular interest to those who desire to be independent of sources of supply and wish to enter into this field.

The following example is given. To 1350 pounds of 76% caustic soda, maintained at 300° C., is added 1300 pounds of benzene sulfonic acid mixture (which may contain 85 to 94% benzene mono-sulfonic acid and from 13 to 2% sulfuric acid and the remainder water). The phenol is then set free by acid.

U. S. Patent No. 1,309,683. M. L. Hamlin. (1919). Hamlin describes a usual synthetic phenol process.

First: sulfonation of benzol to benzol monosulfonic acid.

$C_6H_6+H_2SO_4—C_6H_5SO_3H+H_2O$

Second: conversion to the sodium salt by reacting it with a concentrated solution of NaCl.

$C_6H_5SO_3H+NaCl—C_6H_5SO_3Na+HCl$

The sodium benzene monosulfonate is not completely insoluble and part remains in solution.

Third: the dried sodium benzene monosulfonate is fused with caustic soda.

$C_6H_5SO_3Na+2(NaOH)—C_6H_5ONa+Na_2SO_3+H_2O$

Fourth: decomposition of sodium phenolate with acid and liberating phenol.

$2[C_6H_5ONa]+H_2SO_4—2[C_6H_5OH]+Na_2SO_4$

The mother liquor described under "second" is treated with magnesium carbonate to form magnesium benzene sulfonate from the sodium benzene sulfonate remaining in solution. The magnesium salt is added directly to the sodium salt in the third step.

U. S. Patent No. 1,312,127. R. H. McKee (1919). Step 1, Benzol is sulfonated. Step 2, Sulfonated benzol is neutralized with calcium carbonate and calcium sulfite obtained from step 12. Step 3, The solution of calcium benzene sulfonate is filtered and in so doing gypsum is discarded. Step, 4, The filtrate from step 3 is treated with sodium sulfite from step 14 or with sodium carbonate. Step 5, Calcium carbonate or sulfite is removed by filtration. Step 6, the Filtrate containing sodium benzene sulfonate is evaporated to dryness. Step 7, The solid from step 6 is fused with caustic soda. Steps 8 and 9, The resultant melt is dissolved in water and then neutralized with carbon dioxide or sulphur dioxide obtained in step 2. Step 10, The neutralized sludge contains the phenol which is recovered by distillation. Steps 11 to 15, Deal with the regeneration of caustic soda and the formation of calcium carbonate and sulfite.

U. S. Patent No. 1,430,184. R. Pocius (1922). This invention deals with the production of resorcin from sodium benzene disulfonate. This salt is fused with an excess of caustic soda and maintained until the necessary reaction takes place, after

(*Continued on page 97*)

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Technical Abstract Section

A Concise Review of Patents and Literature

Composition of Matter for Molding. U. S. P. 1,716,623; June 11, 1929. John T. Collins.

A composition adapted to be transformed into a hard, molded substance by heat pressure, comprising a mass of finely separated fibres throughout which mass there is distributed a gummy derivative of black liquor.

A preliminary process for making a molded product comprising the intimate mechanical mixing of a finely divided gum precipitate from black liquor with a finely divided fibrous substance; and then forming the mixture into a mass throughout which both ingredients are uniformly distributed; the said mass being an intermediate product adapted to be converted by heat and pressure to a dense, hard, molded, final product.

Phenol-Resin Molding Mixture. U. S. P. 1,716,665; June 11, 1929. Lawrence V. Redman and Victor H. Turkington, assignors to Bakelite Corporation.

Certain plasticizing agents which are also resin solvents, including aldehydes of high molecular weight, and more especially furfuraldehyde (furfural), when combined even in relatively small proportion with the potentially reactive resin of the known phenolmethylene type, and with the usual fillers, exert an extraordinary and unexpected influence upon the flowing quality of the resulting mixtures. For example a molding mixture containing about 25% of the potentially reactive resin, about 20% of furfural and about 55% of wood-flour exhibits substantially the same flowing quality as the standard mixture containing 50% of wood-flour and 50% of resin. With a resin content of about 30%, a fiber content of about 50% and 20% of furfural, excellent flowing quality is secured in the mixture. In general, the invention in its preferred embodiment contemplates the preparation of molding mixtures containing, say 50 per cent or upward by weight of the fibrous filler, usually wood-flour; about 25 to 40 per cent of the phenolic resin; and the furfural or equivalent plasticizer in sufficient proportion, usually of the order 15-25 per cent, to impart the requisite flowing quality.

Molded Indurated-Fiber Articles and Process of Making Same. U. S. P. 1,717,092; June 11, 1929. Horace H. Clark, assignor to Clark Fibre Products Corporation.

The process of making molded integral shapes of indurated fiber which comprises the following steps: Digesting a pulp formed from old cotton cloth in an aqueous solution containing about 5 per cent of sodium hydrate and about 3 per cent of sodium carbonate for about four hours and under a pressure of from 30 to 50 pounds to the square inch: forming a blank out of said pulp by flowing it into a mold having perforated walls through which is removed a major portion of its water content; drying said blank, compacting it by pressure to expel any entrapped air, impregnating it with an indurating liquid, and further compacting and shaping the walls of said indurated blank by molding under pressure in suitable dies.

Latex Utilization

The most complete and comprehensive review of articles both on the collecting, storage handling and uses of latex (caoutchouc) has just been finished. It represents over 15,000 hours of work and includes full abstracts of all patents, both domestic and foreign.

This monumental work is for sale in typed form, only a few copies will be available. Write the Editor for information. THE ARTICLE WILL NOT BE PRINTED.

Phenolic Resin. U. S. P. 1.717,614; June 18, 1929. George W. Miller, of Chicago, Ill., assignor to Bakelite Corporation of New York, N. Y., a corporation of Delaware.

In the first reaction stage the cresol employed is as nearly as practicable free from phenol, the presence of which in substantial amounts is apt to lead to the formation of a rubbery infusible reaction product. The following proportions by weight are representative:

	Parts
Furfural	100
Cresol	100
Calcium hydroxide	12

These materials are charged into a steam-heated still equipped with a refluxing condenser, the temperature raised to about 230° F., and the reaction continued for about an hour at or near this temperature. The resulting resin is still quite fluid at the reaction temperature and is readily discharged from the still. It does not, even when cooled, form a brittle, readily pulverizable mass suitable for compounding molding mixtures; but may be regarded as a partially-reacted resin in a condition highly sensitive to the influence of further additions of the basic condensing agent.

In order to complete the reaction the hot resin from the still is run into an open kneading or mixing machine, provided with stirring devices, and with a heating jacket. A further addition of about 20 parts of hydrated lime is made to the charge, and the mass heated to about 300° F., is thoroughly beaten and mixed for about 15 minutes, or until it becomes viscous, and a sample cools to a hard and brittle mass.

Condensation Products of Urea and Formaldehyde. U. S. P. 1,718,901; June 25, 1929. Alphonse Gams and Gustav Widmer, assignors to The Firm: Society of Chemical Industry in Basel, of Basel, Switzerland.

120 parts (2 moles) of urea are dissolved in 320 parts of neutral formaldehyde of 38 per cent strength (4 moles). The solution is heated for 3-4 hours in au autoclave at a temperature somewhat above 100° C. To the clear solution thus obtained 12 parts (1/5 mole) of urea and 0.25 parts of ammonium chloride are added. The solvent water is then distilled to a high degree in a vacuum at a water-bath temperature of 40-50° C. until a clear, viscous liquid is produced; this is poured into moulds and heated to 60-70° C. In a short time there is obtained a hard, transparent condensation product.

Method of Making Composite Product. U. S. P. 1,719,930; July 9, 1929. Harold Gray, assignor to the B. F. Goodrich Company.

Method of bonding rubber to metal which comprises coating the metal surface with a material composed in whole or in part of a substance selected from the empirical class comprising sulfuric acid, nitric acid, selenic acid, selenium oxychloride, antimony penta chloride, antimony tri bromide, cuprous chloride, ferric fluoride, lead chromate, mercuric chloride, nickel chloride, phosphorous oxychloride, phosphorous trichloride, phosphorous penta chloride, aluminum chloride, ferrous chloride, chlorsulfonic acid, titanium tetra-chloride, cobalt chloride, cupric chloride, dimethyl sulfate, di-ethyl sulfate, hexachlorethane, pentachlorethane, benzotri-chloride, benzyl chloride, iodoform, naphthalene tetra-chloride, benzene sulfochloride, and p-nitro-benzoylchloride, superposing thereon a vulcanizable rubber composition, and subjecting the assemblage under pressure to vulcanizing temperatures.

Plastic Composition. U. S. P. 1,720,-051; July 9, 1929. Robert Ames Norton, assignor to the Selden Company, Pittsburgh.

Phenol and formaldehyde are combined by well known methods to form a condensation product which can be rendered infusible by heating. The condensation is preferably carried out in the absence of fixed alkalis, water is removed, and 10 to 20 per cent of butyl palmitate is homogenously incorporated with the condensation product, heat being used if necessary to render the former sufficiently fluid to permit thorough mixture. The plasticized condensation product may if necessary be mixed with fillers, such as asbestos, wood flour and the like, and is then used for the production of suitable articles, being finally hardened by application of heat.

A plastic composition comprising a phenol aldehyde condensation product initially fusible and capable of being hardened by heat, homogeneously admixed with a high boiling ester of a polybasic aliphatic acid and alcohols having less than three hydroxyl groups.

Nonturbid Aldehyde Condensation Products. U. S. P. 1,720,052; July 9, 1929. Robert Ames Norton, assignor to the Selden Company, Pittsburgh, Pa.

1,000 parts of phenol are caused to react with 1,000 parts of formaldehyde in the form of a 40% solution, 2 parts of sodium carbonate being used as a condensing agent. From 50 to 100 parts of sodium or potassium acid phthalate or naphthalate are then homogenously incorporated and most or all of the free water is then expelled for example by volatilization, and the residue hardened in the usual manner, resulting in a product showing remarkable freedom from turbidity.

Manufacturing Press Masses From Phenolformaldehyde Resins. U. S. P. 1,720,062; July 9, 1929. Fritz Seebach, assignor to Bakelite Gesellschaft M. B. H. of Berlin, Germany.

Example 1.—100 kilograms of wood meal are mixed with 50 kilograms of a colloidal solution containing 50 per cent of phenolformaldehyde resin, capable or not capable of being hardened, the mixture of which may be performed in a kneading machine and which then, preferably under agitation, may be mixed with 50 kilograms of water. The mixture may then be centrifuged and dried, either at ordinary temperature of at gentle heat and may be, either before the drying or afterwards pressed at heat or at ordinary temperature into various shapes, to form articles.

Molding Mixture Containing Cellulose Acetate and Resinoids. U. S. P. 1,720,192; July 9, 1929. Archie J. Weith and Otto Holzman, assignors to Bakelite Corporation.

The preferred procedure in carrying the invention into effect is as follows:

The fibrous cellulose acetate of commerce is ground in a ball mill to an impalable powder, which for the best results should all pass a 100-mesh screen. A potentially-reactive phenol resin is similarly ground; and thereafter the two materials are mixed, preferably in approximately 1:1 proportions, and the mixture is further ground until the components have been thoroughly commingled into a homogeneous mass. Appropriate dyes or coloring materials may be and usually are incorporated during the grinding operation. Thorough and fine grinding is important.

The potentially reactive phenolic resin may comprise either such phenol-aldehyde compositions as are directly transformable by sufficient heating to the infusible state; or mixtures of phenol resins of the permanently fusible type with hardening agents of aldehyde type or derivation, such as formaldehyde, paraform, hexamethylenetetramine and the like. Methods of preparing such potentially-reactive resin compositions are now well known in this art and need not be further described herein.

Instead of separately milling the ester and the phenolic resin and remilling the mixture as described above, the cellulose acetate which is the slower-milling component may first be milled to about three-fourths completion, after which the resin may be introduced and the milling completed. The invention is not restricted to any mechanical procedure in preparing the mixture.

The resulting molding mixture may be treated in all respects like the usual wood-flour-resin molding mixtures, being molded in the hot-press under substantially the usual molding conditions as respects temperature and time. Thus prepared, the resulting article differs entirely from the usual molded products, especially in that it is translucent; that when dyed it presents a peculiar and altogether distinctive depth and richness of color; and that it has a distinctive feeling suggesting that of jade.

This molded product is to be clearly distinguished from the familiar phenol resin products which are prepared by casting the resin while yet fusible and subsequently hardening. These latter may be rendered translucent by certain additions, usually of a fatty nature; but they lack the toughness which characterizes the molded products having a fibrous filler. The molded product prepared according to this invention does not possess in full measure the toughness which characterizes the wood flour-resin compositions, but it is far tougher than the pure resin.

Plasticized Molding Composition. U. S. P. 1,720,406; July 9, 1929. Harry M. Weber, assignor to Ellis-Foster Company, of Montclair, New Jersey.

100 parts of phenol and 100 parts of formaldehyde, 40 per cent solution, and 12.5 parts of concentrated ammonia were heated to boiling in a suitable vessel under reflux condenser until the resinous product had become a rubbery semi-solid mass. The aqueous solution was separated from the resulting resin, the resin allowed to cool and then broken up and crushed to a fine powder. On molding this resin at 160° C. under 1000 pounds pressure it was found that the resin had very little flow in that the full pressure of 1000 pounds could be applied within 30 seconds after closing the mold without extrusion of the resin. At the end of 5 minutes' time of cure the resinous article was removed from the mold and found to be opaque and had only a fair surface. 2 parts of hexamethylenetetramine-tri-phenol was added to 10 parts of the powdered resin and molded under similar conditions. It was found that it was not possible to apply the full 1000 pounds pressure to the closed mold without causing the resin to extrude from the mold until the resin had been subjected for a period of a minute and a half to slight pressure at 160° C. The full pressure then was applied without loss of resin by extrusion. After allowing the resin to cure for 5 minutes the resulting molded article was found to be translucent and exhibited a good lustrous surface of a very desirable character. The contrast in the two products, with and without the hexamethylenetetramine triphenol was very marked.

Phenolic Resin. U. S. P. 1,720,895; July 16, 1929. Frazier Groff and George W. Miller, assignors to Bakelite Corporation.

The hereindescribed fusible non-reactive resinous reaction product of a fusible phenol-methylene resin, a basic condensing agent, and furfural.

Process of making a fusible non-reactive phenolic resin comprising reacting a fusible phenol-methylene resin with furfural in presence of a basic condensing agent.

Stabilized Nitrocellulose Composition. U. S. P. 1,720,992; July 16, 1929. Gerald R. Barrett, assignor to Merrimac Chemical Company.

A nitrocellulose composition containing a vegetable oil and hydroquinone.

A nitrocellulose composition containing a vegetable oil, an oxidizable resin, and hydroquinone in a concentration of about .01-1 per cent of the vegetable oil and resin.

Polymer of Vinyl Chloride. U. S. P. 1,721,034; July 16, 1929. Iwan Ostromislensky, of New York, N. Y.

Making Battery Boxes. U. S. P. 1,-721,293; July 16, 1929. Frank S. Callender, Detroit, Michigan.

In a method of molding a partitioned battery box by entering a plunger into a matrix containing moldable material, the operation consisting in releasably attaching a conducting member to said plunger for penetration into the partition and for exposure at opposite faces thereof.

Manufacture of Cellulose Esters. U. S. P. 1,722,914; July 30, 1929. Heinrich Heimann and Alfons Bayerl, assignors to I. G. Farbenindustrie Aktiengesellschaft, Germany.

Example.—1 part of cotton is introduced, while stirring, into 20 parts of commercial formic acid of 85 per cent strength and the stirring is continued for about 24 hours at about 20° C. The cotton is then centrifuged and the formic acid still remaining in the fibre is washed away. The cotton which has been pretreated in this manner and dried, may be esterified in the known manner, for example it may be acetylated. The formic acid is in greater part recovered in a concentrated form suitable for treating a fresh batch of material. The washings constitute a dilute formic acid which may be concentrated.

Cellulose Derivative. U. S. P. 1,722,927; July 30, 1929. Leon Lilienfeld, Vienna, Austria.

A process for the manufacture of new cellulose derivatives, which are soluble in aqueous caustic alkalies, but insoluble in water, which process comprises acting on cellulose with a halohydrin of a poly-alcohol in the presence of a caustic alkali solution of substantially less than 50 per cent strength.

As new products, cellulose derivatives in the form of unshaped products and soluble in alkalies but insoluble in water and organic solvents such as alcohol and ether, in which derivatives at least one hydroxyl hydrogen atom of the cellulose is replaced by an oxygen containing alkyl group.

Artificial Material From Cellulose Compounds. U. S. P. 1,722,928; July 30, 1929. Leon Lilienfeld, Vienna, Austria.

A process for the manufacture of artificial materials, which comprises bringing a solution in an alkali of an oxy-alkyl-derivative of cellulose soluble in aqueous alkalies but insoluble in water into the form of an artificial material and treating the solution so as to produce separation of solid therefrom.

As a new product, an artificial material which contains as an essential constituent at least one oxy-alkyl derivative of cellulose which is insoluble in water but soluble in alkalies.

Process of Molding Resinous Condensation Products; Dentures. U. S. P. 1,724,501; Aug. 13, 1929. Gilbert Mombach.

That process of molding artificial dentures comprising plates supporting teeth which consists in making dies of plastic material with one of the dies temporarily holding the teeth to be supported by the plate, employing in that portion of the plastic material which is to temporarily hold the teeth a percentage of material which will disintegrate the plastic die by chemical action with the evolution of a gas, forming the plastic dies, and compressing heated material comprising resinous condensation products between said dies with the teeth imbedded therein.

Process For Preparing Acetone-Soluble, High-Viscosity Cellulose Acetate. U. S. P. 1,723,614; Aug. 6, 1929. Wolfgang Gruber, Assignor to Dr. Alexander Wacker Gesellschaft Fur Electrochemische Industrie, Munich, Germany.

Example 1: 100 parts of cellulose triacetate prepared by any well known method, were dissolved in 500 parts glacial acetic acid and allowed to stand with 80 parts $ZnCl_2.HCl.2H_2O$ at 20 ° C. After 10-15 hours complete solubility of the product in acetone resulted. The precipitation of the final product with water was carried out as usual.

Example 2: Cellulose, acetylated by means of acetic anhydride and zinc chloride, was mixed, after decomposition of the acetic anhydride still left in the mixture, with $ZnCl_2.HCl.H_2O$ in the above proportions, and treated as in Example 1. In place of the $ZnCl_2.HCl.H_2O$ there can be added HCl and water in such amount that they will form with the $ZnCl_2$ already in the solution $ZnCl_2.HCl.H_2O$.

Process of preparing acetone-soluble high viscosity cellulose acetate comprising treating acetone-insoluble cellulose acetate in solution with an acid chloride of a metal of the group consisting of zinc, mercury and copper.

Shoe Stiffener. Albert L. Clapp, assignor to Beckwith Manufacturing Company, of Boston, Mass. U. S. P. 1,739,578; Dec. 17, 1929.

A shoe stiffener comprising fibrous sheet material having one portion treated with a water soluble stiffening agent only and another portion with thermo-plastic material only.

In the manufacture of shoe stiffeners the steps which comprise coating one face of fibrous sheet material with a water soluble stiffening agent, and then immersing the sheet in melted thermo-plastic material.

Manufacture of Cellulose Products. U. S. P. 1,722,202; July 23, 1929. Maurice Cusin and Pierre Alphonse Andre Chevalet, (Societe Lyonnaise de Soie Artificielle, of Lyon, France.)

By the process forming the object of the present invention there may be obtained, in a simple and economical manner, a stable product having all the plastic qualities of cellulose acetate and which is constituted by a hydrocellulose partially esterified by formic and acetic acids.

The cellulose (cotton, wood pulp or other cellulose) is dried, then immersed i nthe following cooled mixture (temperature 10 to 20° C.):

	Cubic centimeters
80% formic acid	50 to 60
Sulphuric acid at 66° Beaumé	5 to 7

This mixture is for 15 to 20 grams of cellulose acoerding to its physical state. It is mixed for about an hour and the surplus acid mixture may be squeezed out.

The following mixture, cooled to 15 or 20° C., is then added:

	Cubic centimeters
Crystallizable acetic acid	16 to 20
Sulphuric acid at 6° Beaumé	20 to 25

It is mixed until, on taking samples, the completion of the reaction is shown. The operation lasts from four to six hours. The mass is then precipitated in water or alcohol in thin streams. The precipitate obtained is washed until neutralization, then it is dried, and constitutes the cellulosic product specified.

Synthetic Resin Composition. U. S. P. 1,722,554; July 30, 1929. Theodore F. Bradley, Montclair, N. J.

A composition of matter comprising as a binder, a resinous complex containing the reaction products of Congo resin, phthalic anhydride and glycerol, in combining proportions.

A resinous complex produced from a heat-treated natural resin, an organic, polybasic, carboxylic acid, and a polyhydroxy alcohol.

Composite Resin Ester. U. S. P. 1,722,566; July 30, 1929. Carleton Ellis, Montclair, N. J.

A resin may be made in the following manner: 150 parts by weight of water white rosin, 32 parts phahalic acid and 16 parts glycerol are heated with stirring, the temperature being raised gradually to 290° C. Preferably the rosin, phthalic acid and glycerol are all heated up together or if desired the phthalic acid and glycerol may be first heated together for a short time to expel moisture but without carrying the temperature high enough to form a resin from these two substances. The rosin is introduced prior to that transition. During the heating to 290° C. a considerable amount of water distills off, this commencing at 185° C. In the example in question after 3 hours continuous heating at 185° C. the temperature was lowered to 150° C. and 20 parts additional glycerol were added. At 240° C. the reaction mixture became more viscous and a sharp odor was noticeable at the upper end of the air condenser employed. The heating was discontinued when the temperature reached 290° C. and a greenish colored hard resin was obtained which was found to be soluble in acetone and a mixture of acetone and alcohol. The acid number of this complex is 11. 100 parts of rosin, 15 parts of phthalic anhydride and 25 parts glycerol heated with agitation to 290° C. gave a hard resin of acid number 7.7. It was found to be easily soluble in acetone and in mixtures of acetone and alcohol or ether and alcohol.

Manufacture of Threads, Filaments, Bands, or Films of a Polished and Transparent Nature, Composed of Plastic Substances. U. S. P. 1,713,289; May 14, 1929. Alfred Landucci, assignor to du Pont-Pathe Film Manufacturing Corporation.

Example 1.—An acetone solution of nitro-cellulose or acetate of cellulose is discharged from a small orifice and is then in immediate contact with very cold water at 4 to 10 degrees C., for example. The precipitation is complete after 1 or 2 minutes, according to the diameter of the stream. The

resulting opaque filament is dried in hot air in a chamber which is mainment whose brilliancy, flexibility and strength are quite remarkable.

Mixed Organic Esters of Cellulose. U. S. P. 1,704,282; Mar. 5, 1929. Hans T. Clarke and Carl J. Malm, assignors to Eastman Kodak Co.

1. A mixed organic ester of cellulose, which is soluble in acetone and insoluble in benzol, said ester containing, for every 24 carbon atoms in the cellulose group, less than 4 but more than one-third of one acyl groups selected from the higher fatty acids having more than 8 carbon atoms, the remaining acyl groups being selected from the lower fatty acids having more than 1 and less than 5 carbon atoms.

Soluble Cellulose Esters Containing Phthalic Groups. U. S. P. 1,704,306; Mar. 5, 1929. Ray L. Stinchfield, assignor to Eastman Kodak Co.

1. An organic ester containing a cellulose group esterified with a phthalic group, said ester being soluble in an organic solvent.

9. In the process of making phthalic esters of cellulose, treating cellulose material containing an esterifiable hydroxyl group to the coaction of a phthalic acid ester containing one free carboxyl group and a substituted organic anhydrid material which impels carboxyl groups.
reaction between said hydoxyl and

Mica Insulation. British Patent No. 288,260, April 5, 1927; J. M. Coffey.

Mica flakes are agglomerated by a condensation product of glycerol and phenol or its homologs (which may be used in alcohol solutions). Details of manufacture and use of the condensation product are given.

Molded Masses From Blood. Felix Homberg and Max Landecker, assignors to American Nuplax Corporation, of New York, N. Y. U. S. P. 1,732,016; Oct. 15, 1929.

95 kgs. of native (water soluble) dry blood were intimately mixed with 5 kgs. of zinc white, for a period of five hours in a mixing drum of a usual construction. Then 15% by weight of water was added to the mixture and the whole mixture was mixed for four hours in the said drum. The resulting material was powderlike, and resembled sea-sand. This powder was then filled into molds and pressed in hydraulic presses under 200 atms. pressure and at a temperature of 105° C., for one and one-half minutes. After cooling, the molded article was hardened with formaldehyde solution in the usual manner.

Molded Friction Lining. Thomas L. Gatke, of Chicago, Ill. U. S. P. 1,738,291; Dec. 3, 1929.

A flexible elongated strip of friction lining of moulded one-piece construction for association with a flexible curved backing element, charac-

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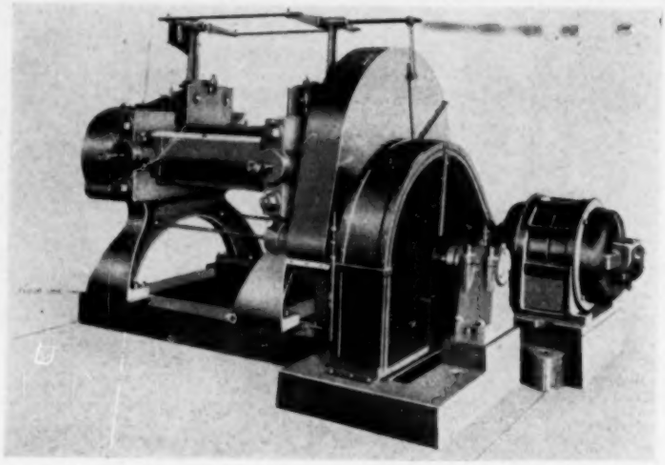

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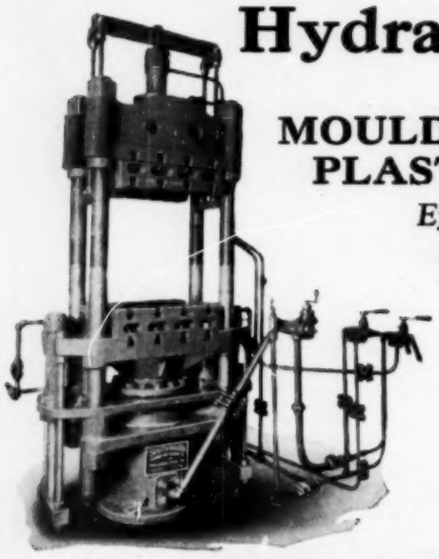

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terized by a series of integrally connected friction blocks composed of superposed layers of fabric enveloped in and held together by a mouldable friction material, all of the layers in the blocks extending without interruption from one block into the next.

A method of forming friction linings for application to curved backing elements, which consists in moulding superposed layers of fabric impregnated with a mouldable friction material, in such a way that the layer nearest the friction face of the lining is placed under greater tension than the layer nearest the opposite face of the lining.

Production of Molded Masses from blood. Felix Homberg and Max Landecker, assignors to American Nuplax Corporation, of New York, N. Y. U. S. P. 1,732,015; Oct. 15, 1929.

Example 1.—Rods

100 kilos of commercial, water soluble dry blood were moistened with 22 kilos of a water solution, containing 2% by weight of zinc chloride. This mixture was put into a regular mixing mill which was run for 6 hours in order to get an intimately mixed powder, after which the resulting powder was put into a usual extrusion press, where it was pressed under 300 atms. pressure, and at 100° C. temperature. At the mouth-piece of the press appeared the desired rod, of a deep black color, which was then hardened by formaldehyde solution in a known manner. The rods were suitable for the manufacture of all kinds of turned objects such as handles for umbrellas, canes, and knives, beads, chess-men, ornaments, etc.

MOLDED SOUND

A Review of the Record Art soon to appear

Vinylite Resins

(*Continued from page 81*)

order to allow ample room for the uncompressed powder.

Molding should be carried out at a temperature of 200° to 225° F. under pressures of about 1000 lbs. per square inch.

Ordinary polished steel dies may be used and although chromium plated or stainless steel dies retain their polish longer when the dies are not in continuous use ordinary steel dies are entirely satisfactory.

Vinylite 80-C is a thermoplastic resin, i. e., it does not set to an infusible resin in the manner that phenol formaldehyde resins do. For this reason the molding procedures used for

shellac or cellulose acetate should be used with Vinylite 80-C.

This resin molds very well and gives very sharp impressions. It has a very small coefficient of expansion and as comparatively low temperatures are employed the molded article when cold is of the same dimensions as the die.

Vinylite molded articles do not surface arc, have a very low moisture absorption and are extremely inert to acids, alkalis, etc. For this reason, this resin promises to be of considerable use in making molded articles for the electrical and other industries.

Disaster Teaches Lessons

(*Continued from page 73*)

and downwind from the film fire showed no effects, owing to the rapid dilution of the gases.

22. X-ray films made from cellulose acetate show little tendency to decomposition and are nonexplosive. They do not generate deadly gases, except those common to combustion, as carbon monoxide. This type of film is alleged to possess certain properties which render it not so satisfactory for photography as the nitrocellulose variety. Viewed from this angle, the board made no investigation and submits no opinion upon the same.

Note.—The foregoing paragraphs apply only to developed film, since undeveloped film contains light sensitive silver bromide which deteriorates with age and the film becomes unserviceable. Hence, it is extremely unlikely that a sufficiently large amount of undeveloped film would accumulate in hospitals and other places to constitute a danger from fires.

Recommendations

1. When large quantities of X-ray nitrocellulose films are to be stored, it is recommended that a competent engineer be consulted as to the construction of the storage room and that

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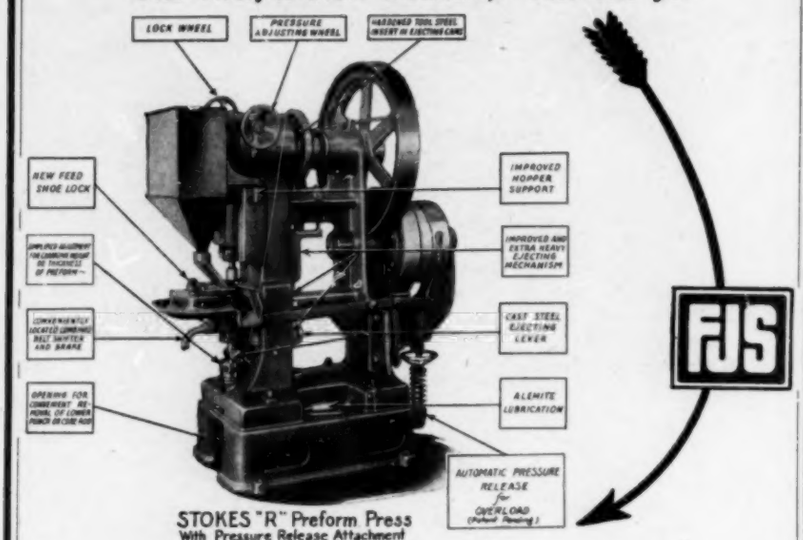

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care be taken to comply with local ordinances, regulations of the National Board of Fire Underwriters, suggestions of the Associated Factory Mutual Fire Insurance Companies, recommendations of the Eastman Kodak Co., and other manufacturers.

2. Separate storage rooms should be used for film alone. These rooms should be of strong fireproof construction, and, preferably, should be located on the roof or outside of the main building—never in the basement. The rom should be provided with adequate vents with automatic release placed in the upper part of the room and with an effective, quickly operative automatic sprinkler system. Only one entrance should be provided and this should be protected with an automatic fire door.

Only hot water or low-pressure steam pipes and stationary lights should be permitted. Radiators, pipes, and lights should be protected and should be placed at least 2 feet distant from the film. Direct sunlight on the film should be avoided, and the room should be kept at least reasonably cool.

3. The film should be kept in envelopes in metal filing cabinets with slatted shelves protected from all sources of heat and carefully guarded against contact with open flame, sparks, lights, etc.

Caretakers

4. The personnel admitted to the storage room should be limited to those carefully instructed as to possible dangers. Prominent signs should be displayed, prohibiting smoking and calling attention to the inflammable nature of the material. Stereopticon should not be allowed in the room.

5. Film stock not in current use outside of the storage room should be kept within the smallest reasonable limit and should be protected by storage in metal cabinets, which should be adequately vented to the outside of the building.

The report also includes some highly interesting experimental work, both on the ignition of cellulose nitrate film by contact with heated electric light bulbs, and even mere steam pipes. There were also very extensive tests on the fumes given off when cellulose nitrate film burns flamelessly (i. e. "fumes off"). The toxicity of the nitrous fumes, and of the carbon monoxide is also discussed and methods for medical treatment are recommended; these being however outside of the scope of our journal.

Copies of Full Report

We strongly recommend that all manufacturers and fabricators of materials containing cellulose nitrate in any form, such as films, celluloid and other pyroxylin plastics, producers of cellulose nitrate lacquers and users of lacquers obtain a copy of this bulletin which is obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C.

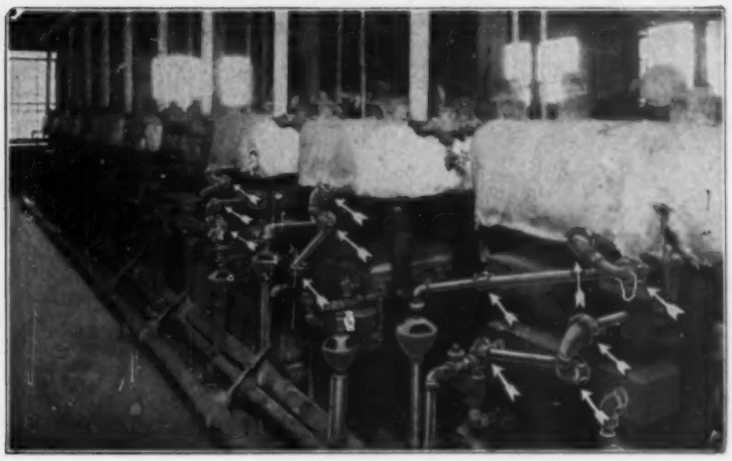
The Board, in concluding the report says that this report or excerpts therefrom should be given wide publicity for the purpose of educating persons and institutions concerned with the storage of large quantities of cellulose nitrate films and other similar materials enumerated in the report.

Electrically Heated Platens

(*Continued from page 85*)

platen is repeatedly heating and cooling, that a pressure may be unequally exerted due to the size and shape of the dies pressed between the platens and, therefore, the factor of safety in designing a platen for presses must be increased considerably, more than is usual with most classes of apparatus.

Presses can be fitted with platens, with two platens per press, or three, or any required quantity, although three is as usual in practice now as two. With electrical equipment, it is



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easier to make connections onto a platen than to steam heated presses by reason of the fact that electrical connections can be made extremely flexible, and are more dependable.

Temperature Control

Regarding temperature control, there are several ways in which this can be accomplished by means of control instruments. The temperature of each platen can be maintained separately at a different figure by means of a gauge on each platen, or the control bulb can be placed in one platen and control the temperature of the other platens in the same press. As the connection from the bulb to the gauge is of flexible steel, whether the control is put in the moving platen or in the fixed platen is of minor importance. It should be noted that single gauge controls have been used on three-platen presses with the control on the middle platen with satisfactory results. Whether each platen shall be separately controlled, of course, is largely dependent upon the requirements of the user, but this statement is just to make clear that one or more temperature controls can be used.

Available Sizes

Electrically heated platens can be arranged for single, two, or three phase electrical circuit conditions, as occasion demands, and obtain the balanced load conditions, usual for industrial equipment. Electically heated platens have been successfully made up to 40" square and any demands can be met more efficiently with electrical heat than any other heating medium. The illustration shows a typical press equipment with temperature control on each platen.

Earlier on in this article, it was stated that the temperature gradient between the surface of the platen and the heating element was an important factor in temperature control. This is readily comprehended when it it realized that the bulb of the

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control gauge must be exposed to a temperature which closely approximates the surface temperature of the platen. However, the control gauge bulb cannot be inserted on the surface of the platen, but at some point nearer the heating element, and if the platen and heating element are not properly proportioned, the temperature control will be erratic. Temperature controls should be readily adjusted to any required temperature and the scale indications easily read.

It is realized that, with carefully design and proportioned electrically heated platens and temperature controls, a more general use of platens with high operating efficiency and great adaptability will result.

Phenol Synthesis

(*Continued from page 86*)

which the same is dissolved in water. The resulting liquid contains resorcinate together with the excess caustic soda in solution and sodium sulfite or sodium chloride. The caustic soda solution containing resorcinate is used over and over again until a sufficient quantity of the desired product has accumulated and the same may be removed from the liquid in the manner well known to those skilled in the art.

U. S. Patent No. 1,466,991. P. Cottringer, (1923). Calcium benzene sulfonate is made by neutralizing the mixture of sulfuric acid and benzene-sulfonic acid with calcium sulfite or carbonate. There is also formed calcium sulfite or carbonate and carbon dioxide or sulfur dioxide. The calcium benzene-sulfonate is then heated in a drum or cylinder with four (4) to seven (7) equivalents of slaked lime to a temperature of 500° C. A current of steam and carbon dioxide or sulfur dioxide is passed through the drum. The temperature of the drum should be high enough to maintain the steam in a vaporous state. The condensate collected will consist of two layers, the upper is a saturated solution of water and phenol and the lower layer is a solution of water, diphenyl oxide, diphenylene oxide.

U. S. Patent No. 1,208,833. A. S. Ramage. (1916). Oils from low temperature distillation of coal consisting of olefins are

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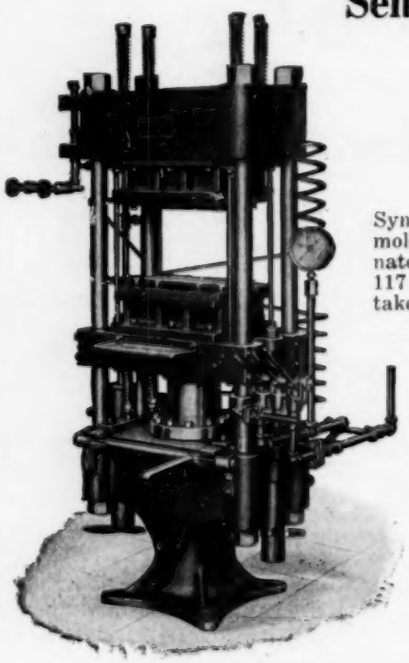

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converted into phenol and cresol by hydrogen acting in the presence of a catalyst (reduced nickel on asbestos). The oils containing the higher boiling tar acids are sprayed into heated tubes containing the catalyst together with an excess of hydrogen gas. The catalyst is heated to about 600°-650°C., in which case 50% of tar acids are converted to phenol and cresol.

U. S. Patent No. 1,274,394. H. H. Dow (1918). Mono-brom-benzol is heated with a dilute caustic soda solution until a pressure of 300 pounds is produced.

$$C_6H_5Br+2NaOH—C_6H_5ONa+NaBr+H_2O$$

The resulting sodium phenolate is converted into phenol treating the same with a dilute solution of carbon dioxide.

$$C_6H_5ONa+H_2CO_3—C_6H_5OH+NaHCO_3$$

U. S. Patent No. 1,455,668. I. H. Derby and W. Higburg (1923). The invention relates to the production of pure cresol from crude tar acids. Crude tar acids are treated with a caustic soda solution and the solution thus obtained is boiled until the distillate comes over clear and free from pyridin. The boiled liquid is then acidulated. The oily layer which separates out is fractionally distilled and the fraction coming over between 175° and 215° C., is collected. The cresol fraction is again treated with caustic soda and the solution mixed with benzol or toluol. Water is added to this mixture which dissolved out the sodium phenolate and the benzol contains the purified fraction of cresol.

U. S. Patent No. 1,547,725. C. H. Bibb. (1925). Benzene in the form of vapor is mixed with oxides of nitrogen with or without air or oxygen and the mixture passed through a heated chamber. The heated chamber is a tube of silica, porcelain or fireclay and heated to a dull red heat. An apparatus suitable for practicing the invention is described.

U. S. Patent No. 1,595,299. W. J. Hale. (1916). An autoclave is

one third filled with a 20% caustic soda solution containing small amounts of oxides of uranium, vanadium molybdenium or tungsten and an equal volume of benzene is added. The mixture is heated to a temperature ranging from 320° to 400° C., and to a pressure of approximately 3,000 pounds per square inch.

U. S. Patent No. 1,607,618. W. J. Hale and E. C. Britton. (1926). Chloro-benzene and caustic soda in an aqueous solution are heated in an autoclave to a temperature of about 370° C., and to a corresponding high pressure. Sodium phenolate and diphenyl oxide are formed.

(1) $C_6H_5Cl+NaOH—C_6H_5OH+NaCl$

(2) $C_6H_5OH+NaOH—C_6H_5ONa+H_2O$

(3) $C_6H_5Cl+C_6H_5ONa—C_6H_5OC_6H_5+NaCl$

The sodium phenolate and diphenyl oxide are separated from the reaction mixture and then separated from each other. The sodium phenolate will then be acidified to recover the phenol. Diphenyl oxide is continuously returned to the mixture that enters into the initial stage of the process until a state of equilibrium is produced. The formation of more diphenyl oxide is thus depressed.

U. S. Patent No. 1,274,961. R. N. Wallach. (1918). A hot concentrated solution of benzol sulfonic acid is added to caustic soda, fused and kept at a temperature of 300° C.

U. S. Patent No. 1,208,833. Bostaph Engineering Co. Brit. Pat. 160,274 (1917). Phenols are obtained by treating the vapors of tar acids of high boiling point, such as those obtained in low temperature distillation of coal and boiling at 210-300°, with hydrogen in the presence of a catalyst such as nickel. The preferred catalyst is nickel which is reduced from its hydroxide at temperatures below 325° C. and distributed over long-fibered asbestos. The product passes a condenser which refluxes the unconverted material back to the tank.

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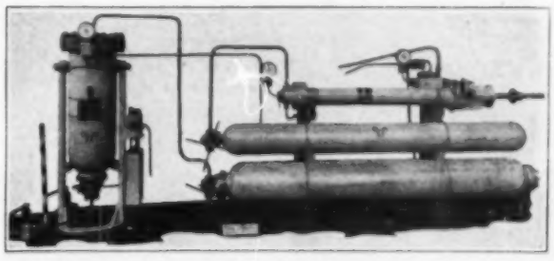

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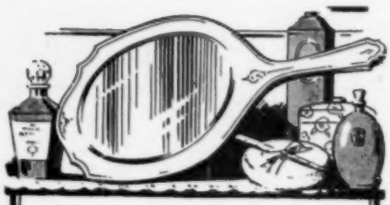

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Vol. 4 FEBRUARY, 1930 No. 2

Trends in Radio and Their Bearing on Molded Tube Bases

High-Frequency Transmission and Broadcasting Bring up Insulation Problems which may force Tube Manufacturers to seek other materials than Molded Resinoids for tube bases

By E. B. Saul

WITH the recent growth of radio to the position of one of the nation's first ten industries, no one group of manufacturers have been benefitted more than the makers of vacuum tubes. Since every receiving tube used in commercial radio today is mounted upon a base of a moulded phenol compound, the moulded products industry should have a keen interest in the present and future of this market. That the future of the vacuum tube base market is intimately connected with recent developments in radio theory and practice is a factor little appreciated by the manufacturers themselves. The main purpose of this article is to offer, with a minimum of electrical theory, an explanation of these developments; and to attempt to anticipate the results of them upon the design and sale of moulded tube bases.

Earliest Vacuum Tubes Had No Bases at All

The first vacuum tubes were made without any bases at all, merely having the leads coming through the glass seals; or having a metal screw base for the filament connections, the other leads being free of any support. This was possible at the time only because the users of these tubes, scientists and experimenters, were men who were willing and able to take the special precautions necessitated by such a construction.

A molded tube base of the type that have been manufactured to the extent of 130,000,000 in 1929

The development of the commercial transmission of messages, and later, of commercial broadcasting, brought in another factor. The tubes were now being used by the layman, who would not, and very likely, could not, handle the fragile lead wires properly in using the tube. The tubes were also being used on ships, where the vibration and the motion made necessary proper mechanical support. Because of these factors, the tube base was developed.

The function of a tube base is mainly mechanical. It supports and holds firmly the tube proper, and protects the fragile glass tip which is the seal of the tube. The base also provides a solid, low resistance, electrical connection to the internal elements of the tube, and holds these connections rigidly and in their proper relation to each other. By means of the base the tube may be quickly and easily placed into the device in which it is to be used.

Until recently, the base of the tube was not considered as having any relation to the workings of a radio tube, either positively or negatively. A radio tube was assumed to function equally well with or without the base. This point of view is now undergoing a change.

Low Wave Operation

This change is due to the increasing interest and investigation being carried in the field of high frequency, that is, low wave length, transmission and reception. It was started, insofar as the tube base is concerned, by the radio amateur. Driven by legislation from the wave-

length band of 200 to 300 meters to the 40 meters, 20 meters and 5 meter bands, and experimenting in these regions, he found this remarkable fact. Radio tubes will not function with maximum efficiency at very high frequencies unless the base of the tube is removed. This has been verified by the research laboratories of the various tube manufacturers. The reasons are these.

When working at very high frequencies, the effect of the small capacity within the tube, due to the elements of the tube, becomes important in that they are the limiting factors in determining the highest frequency at which the tube may be used. The presence of a base made of a good dielectric material in close proximity to the leads of the tube increases the effective capacity of the tube elements. This, of course is undesirable, as the trend today is toward the use of high frequencies in transmission.

Above are some tubes of various types for which bases have been molded during the past ten years. Below are the numerous elements which enter into radio tube construction, in which but one factor is the molded resinoid base.

Heat Is An Element To Be Considered

The voltage used in tubes has changed from the forty-five volts of ten years ago to the 450 volts of today, in such tubes as the type 250. A tube base limits the distance that the leads may be separated. If a higher voltage is used, the lead wires of the tube are brought out further apart to prevent arcing. In some cases, they are as far apart as the geometrical shape of the tube will allow.

Large, high voltage power tubes also run at a very high temperature, due to the amount of power dissipated in the form of heat. Sometimes this power dissipation is so high that the tubes must be cooled by fans. The latest transmitting tubes have water jackets built into them. Obviously, a moulded base could not be used on such a tube, and so the bases are made of metal, using a ceramic where an insulating material is necessary.

We are therefore led to the conclusion that if the present trend of tube development continues, the moulded base of today will become obsolete. The tube of the future will possibly be a glass vessel, with four or five or more leads coming out of it at individually isolated points. The base or bases, if any, will be of metal, or some other heat resisting substance.

That this is the trend of development can be seen by examining many of the tubes in commercial use to day. All the power tubes of over 100 watts output use metal bases. The popular 224 tube uses a metal top cap. The newest rectifier tube, the UV-872, uses both a metal top cap and a metal base.

In 1929, more than 130,000,000 moulded tube bases were produced by the moulding industry, which represents a production about 50% in excess of the 1928 total. The moulding industry which met this demand is, according to opinion, ready to meet this requirement several times over on short notice, if necessary. Such a possibility still exists.

How soon the moulded base will disappear depends upon research now in progress. Whether it will be tomorrow or ten years from now cannot be said. Possibly, by that time, the moulded products industry will have developed new materials with different properties which will be adaptable to the new designs.

Lecture Course on Synthetic Resins at London Polytechnic

A course of lectures will be held at the Borough Polytechnic Institute, London, on Wednesdays (7.30 to 8.30 p. m.), commencing 22nd January, on the subject of "Synthetic Resins, Moulding Powders and Plastics." The lecturers are men actively engaged in the manufacture or use of the different types of resins and plastics, and they will deal with the manufacture, properties, uses and future possibilities of the products. The first six lectures will be Thiourea-formaldehyde Resins, Mr. A. V. Keller, F. C. S.; Phenol-formaldehyde Resins, Mr. H. V. Potter, B. Sc.; Casein Plastics, Mr. R. Dodd, B. Sc.; Nitro-cellulose and Cellulose Acetate Plastics, Mr. J. E. Beard; Methods of Moulding, Moulds and Moulding Machinery, Mr. A. V. Keller, F. C.S. and Liquid Cements and Binders, Mr. J. Taylor, B.Sc. Dates and lecturers will be announced later for lectures on Coumarone and Indene Resins, Glyptals, Artificial Glass, etc.

Foreign Markets Are Ready to Absorb American Molded Products

Manchester Mfg. Co.'s Molded Bakelite and Aldur Lamp and Shade Find Many Quantity Outlets Abroad

By B. Holm-Hansen
Export Manager, Manchester Mfg. Co.

THE American Manufacturers who have such a large home market have been, as a rule, disinclined to extend much effort on foreign trade. This also applies to the manufacturers of moulded products. It can be said that the proportion of products in this industry, sold abroad, is much below the average are competing nations, who export a very considerable part of material under this category. Our largest competitors in this field are, of course, first—Germany, then Great Britain, and to a certain extent France and Sweden.

The export of Moulded Products is very hard to keep tab on. There exists no export statistics that shows figures upon which a reliable judgment can be based. So much under this heading goes out as parts of other manufactured items in the electrical, radio, and allied industries, that it would be unpractical to have a specific figure covering moulded products.

Natural Outlets in Canada and South America

Products of the American Moulding Industry go, to a smaller extent, only, to Europe, where the competition is extremely keen. Our natural markets are Canada and the South American Republics, especially, Argentine and Brazil. Good markets are also Australia and New Zealand, and to a certain extent China and Japan.

It is not in the smaller inexpensive items in the electrical and radio industry that America shines. It is in the excellently made special products with the high finish and appearance that we have success.

Manchester Manufacturing Company has now put on the market an entirely new item, namely, boudoir and bedroom lamps with shades to match, made of Bakelite and the beautiful material Aldur. These lamps are supplied in translucent colors, and with the quantity produced, it has succeeded in bringing the price on these beautiful articles down to such a price level that they will out distance practically all lamps now appearing in the market.

Mr. Hansen has had many years merchandising experience in the export field, with contacts in South America, Australia and the Far East.

The lamps have been received with the greatest enthusiasm by several of the largest electrical distributors in Canada. who promise an extensive trade in that territory. Orders and inquiries from Latin-American countries and the West Indies. and especially from Argentine and Brazil, show a good size opening also in the Latin-American markets.

Important inquiries are now also coming in from Japan and China, which show that the Manchester Lamps have a universal touch. The almost limitless number of colors and color combinations obtainable in Bakelite and Aldur makes this new item in the Moulding industry stand out as a real achievement.

1930 Export Production Estimated at a Million Dollars

The Manchester Manufacturing Co. is of the opinion that they have added an item of great importance to the electrical export industry in the present molded lamp and shade. Various types have been tested before this was offered to the export markets and extended research has indicated that foreign consumers would absorb a production approximating a million dollars in value. On the strength of direct studies made, manufacturing schedules for 1930 call for a distribution of molded lamps together with their values as follows:

Canada	$250,000
Argentine	150,000
Australia and New Zealand	150,000
Brazil	100,000
Great Britain	100,000
Europe (others)	130,000
South America	70,000
Central America	80,000
China and Japan	80,000

Statistics indicate a remarkable expansion in the United States foreign trade. Compared with the first half of 1928, our export in 1929 shows an increase of 10.3%.

The new item within the moulding industry, namely, Boudoir and Bedroom Lamps made by Manchester Manufacturing Co., is one of the many items that will bring a continued increase in our export trade. We would not be surprised if the increase caused by this one item alone would exceed a million dollars the first year.

All Plastic Industries Showed Steady Growth During 1929

Molded and Laminated Products, Powder and Plastic Solids, Raw Material Producers, reflected gain by increased Volume and Values

By R. C. Gilmore, Jr.
Pres., Plastics Publications, Inc.

THE writer has made a careful study of conditions and markets in the preparation of this review. With the exception of one or two chemical statistics, PLASTICS does not rely on the government or any outside source for its information—it cannot. This material was, therefore, collected through a series of interviews, questionaires and researches extending over the past six months. We are indebted to our foreign collaborators whom we mention wherever possible, to CHEMICAL MARKETS and to the spirit of the industry in helping us to get the facts.

FINISHED business for sixty-one custom molders during 1929 equalled $27,716,061.00. This figure is a combination of NEMA statistics, which are not complete and cover only 21 molders, and a personal knowledge of sales in other plants for the year. I made no survey in dollars in 1928, but the above figure represents, in my opinion, an increase of about 20% over the previous year. It is impossible to give figures on consumer molding, but the percentage increase is much less. As will be seen, this progress, although natural, is not in keeping with other branches of the industry. It is the result of two things: lack of co-ordination and unethical methods. The stock market affected only five companies out of sixty-one, and that only in the last quarter. The rest have only themselves to blame. While this is the biggest year in history, no right thinking man in the industry can be content with things as they are. The gain could, and should, have been 40%. If things get reorganized quickly that gain will come this year.

NEMA
Molded Insulation Section
Report of Finished Business*

October	$886,000
November	557,000

*21 companies reporting

Molding Industry Missed Its Chances

The first quarter of 1930 looks on a par with the last quarter of '29. That is the consensus of opinion. I agree that certain seasonable slumps, in combination with average sales reactions, would have this effect. But one cannot but be extremely hopeful for the balance of the year if—and there's the rub—business is done in a sound manner. Several of the evils, such as the unsalaried salesman or the lack of buyer education, are very noteworthy stumbling blocks. If these are removed, the industry then banded together, nothing can stop that figure from becoming 100%.

"IN determining the business outlook for the molding industry, we must consider that the present generally admitted slack condition will be felt, although in a lesser degree, during the first quarter of 1930. It is highly probable that, with the exception of the above mentioned period, this year will be on a par with the past one. I believe, however, that the outlook is generally favorable and should encourage nothing but thoughtful optimism."

C. A. Kurz, Jr.,
Chairman, Molded Insulation Section.
NEMA

Building has been about on a par with '29, with several new plants throughout the country, especially in Ohio and Illinois. There were four failures and

Light-Colored Powders Enter Field Phenolic Materials Stronger in 1929

The entrance of new molding compounds was by far the most important development of the year. After many years research, the Celluloid Corporation announced their cellulose-acetate powder, Lumarith, in May. The American Cyanamid Company acquired American rights of Beatl, the thiourea material formerly made exclusively in England, and through a subsidiary, the Synthetic Plastics Co., stated active production early in the fall at Bound Brook, New Jersey. Aldur, an American urea material of the Aldur Corporation, was put on the market about the same time, and Pollopas entered into the field under the name of Luxite, handled by the Wilbur & Williams Company. Carbide and Carbon ended the year by announcing Vinylite late in December. Two other new materials that were expected to be on the market before 1930 never appeared, perhaps being saved for a less competitive announcement, but Celeron, after being taken over by Continental Fibre was removed from the custom molding industry. The Bakelite Corporation kept step with this fast pace by bringing out a new material, XM-1000.

All of the materials seemed to fill an especial need, in spite of the fact that many of them produced identical color effects when molded. They were not, it

four new concerns in the field at the close of the year. There were, also, four reorganizations affecting financial structure; one of them did not succeed. At the present time a rather ambitious plan of consolidation is under way which, if successful, would join five or six of the smaller companies. The Scranton acquisition was, perhaps the highlight of such actions during the year. Some of the smaller plants, however, have profited immensely by increased budgets, and while it is reported that two of the larger companies are endeavoring to reorganize, such things are still for the future.

All in all, the molding industry is on a firmer footing than before. At least it can see the road, to follow it or not is another question answerable only with time.

The following statistics, gathered for the first time, may be of use in determining potentials:

61 Plants

Average # of presses (hand)	18
Average # of presses (auto.)	6
Average # of press hands	28
Average # of other employees	26
Average size plant (floor space)	110x68
Average # of molds in hand but not operating	56

The ratio of plants operating tool rooms to plants not operating is 2:3

Molders Applied for Trade Regulations

Several important developments came into the industry during the year, and it is easier to go back through **Plastics** to find them than it is to present them again now. Chief among these was the Federal Trade meeting in Washington, on which no action has been taken to date. The Association has done one thing well, however—it has gathered together again, for better or worse, all disputed points for a final understanding.

General conditions in Europe were quite satisfactory, and a more detailed article by our British correspondent is elsewhere in this issue. Carl Marx, the Editor of **Plastics**, was in Europe for a month in the fall, and in his belief they are still limiting themselves to every day production. New applications, especially in Germany, are not exploited to the extent they deserve and America is far ahead of her sister countries in everything but the number of molding materials.

Austria

	Imports lbs	Exports lbs
Celluloid	133,540	1,254
Syn. Resins	121,220	247,720
Finished Buttons	2,640	10,780
Films, Crude	13,440	2
Other Films	55,220	7,480

The only plants hit by the Wall Street débacle were those specializing in either radio or automotive work. With increased sales effort coming from these two sources, as well as to them, this business should be in hand again by May. The lesson, if any, would seem to be: balance your work, not only for seasonal slumps but as a protection against temporary saturation.

Laminated Figures Show 30% Increase

1929 was, for the laminated industry, the biggest year in history. Eight companies constitute a virtual monopoly of laminated plastics in this country. Their sales have been greatly increased through concentrated effort along all fundamental and progressive lines, for they make up one of the sections of the National Electrical Manufacturers' Association. Detailed figures are given elsewhere in this article, and the total, $17,942,583, shows an increase of $6,131,954 over 1928—a truly remarkable gain. This is also an increase of $10,119,-203 over the business for 1927. The laminated field is becoming more and more important, and it is primarily the result of new applications, for which all laminators are constantly searching. The reported European total would raise this domestic figure to roughly $26,000,000. None of the American companies made any great effort to construct

(*Continued on next page*)

is true, greeted with astounding success, but this may have been the result of the molders natural caution rather than a fault in material. It is believed in some quarters that some of the materials were announced before their proper time, thus creating a demand before any supply was in hand. Lumarith is certainly now being molded on a commercial scale, and an aggressive sales policy will go a long way in opening up its rightful position in the coming months. Aldur and Beetle are both being molded and sold through retail channels and they both seem to promise much for this coming "year of color". It is understood that Wilbur and Williams are negotiating to make Luxite in this country, instead of importing it, which would place it on a more or less equal footing with the others.

As for existing companies and business, the Bakelite Corporation bought a large tract of land in New Jersey especially for formaldehyde manufacture, although this will act as an additional manufacturing center for other of their products. The Makalot Corporation purchased a new plant at Waltham, Massachusetts, where they are now manufacturing powder in greatly increased quantities. Mr. Gordon left General Plastics during the year to go into another industrial line, and, while neither they nor the Stokes & Smith Company expanded physically, nevertheless both their businesses showed remarkable increases.

(*Continued on page 106*)

England

Importations of Resins

1927	15,164 cwt.
1928	33,335 cwt.
1929 (estimated)	45,000 cwt.

(British Board of Trade)

new plants, although some new construction was reported in the north eastern territory. It is believed that a new plant is now in operation in Italy, and at least one newcomer is expected in this country during the year. P. H. Ott, of Westinghouse, is chairman of the Laminated Section of Nema.

Laminated Phenolic Products—Eight Companies—Billings: January-November, 1929 (non-gear stock only)*

January	$ 812,036
February	874,634
March	883,282
April	909,774
May	1,005,758
June	1,036,582
July	1,267,559
August	1,465,088
September	1,169,150
October	1,296,782
November	564,245
December (estimated)	675,000
*Gear Stock Totaled	$4,566,686

for eleven months of 1929.
Estimating December at $425,000

Light Powders Enter, Dark Stronger in '29

(*Continued from page 105*)

To come to figures, no matter what is written it will be disputed by some, and while we are sorry we cannot pacify all, yet we must write the figures as we have collected them. There was certainly 35,500,000 lbs. of phenolic resinoids produced in this country during 1929. The majority of it (between 85 and 90 per cent) was sold to the molding industry and the remainder was for the makers consumption. This in spite of the 18,000 ton world figure mentioned in England last month. Other materials, cold molded excepted, bring this total to almost 60,000,000 lbs., and when cold molded is counted at 12,500,000 the total is then readily obtainable. This is an increase of 22.6% over 1928 and of 41% over 1921.

The industry looks well off. With the exception of the first quarter, 1930 should be better, in every way than 1929. Whether it means more profit or not is up to the individual.

Second Decade For Casein Plastics Will See New Outlets

Readers of other publications recently saw the following figures in regard to casein:

date	No. of plants	Output (lbs.)
First half '29	180	16,570,000
First half '28	140	12,681,000
Year 1928	140	22,151,000

The above are good measures of paper consumption, perhaps, but mean little or nothing in regard to plastic manufacture. But casein figures are extremely hard to get—I mean figures on finished casein plastics—so we give the above, at least. The four main manufacturers in this country report greatly increased business for the past year and are all in high hopes for the future. Old applications seem to be of the utmost importance still, although several decidedly new markets have been created by the aggressive sales policy of one of the largest in the field. Practically the same situation exists abroad, although there is less hope there for increased sales in 1930. While no new construction is reported, a reorganization of one domestic company is almost completed. In June the Aladdinite Company, the oldest in the country, observed its tenth anniversary. I confidently expect 1930 to give a large increase to casein sales, even exceeding the 30% gain reported this year.

Demand For Chemical Bases In Step With Industry's Rise

From the standpoint of chemicals and allied products, 1929 proved to be a year of expansion and, in some cases, price reduction of many products used in the plastic industry. Phenol, acetone and several solvents were the leaders in lower prices as a result of improved processes, and the reaction was carried out, to some extent, in the finished material. Formaldehyde prices remained fairly steady, although there has been a steady supply of it, and in spite of the rumor of lowered production costs is now quoted at $.375 per lb. in 100 lb. lots. The high price for the year was in the neighborhood of $.42. Alcohol is one where prices are considerably lower than they should be, and it is said that it should sell from six to eight cents higher per gallon. The recently lowered price on methanol should tend to lower formaldehyde prices and, combined with the lower phenol price, make phenolic resins less expensive, although this may not be certain in the light of other, competitive, supply houses. 40,000 tons of wood flour were produced here in 1928, the last statistical year, and slightly less than 14,500,000 lbs. were imported in the same period (valued at $94,723).

Foreign Sources Active

In Europe, England experienced a slackening of phenol output, but an active year in dyestuffs. The French dye industry was strong and the general chemical progress there was highly satisfactory to French plastic manufacturers. A noteable development there was the new solvent, "Ketol". Germany was extremely active in dyestuffs (F. G.) and is making a strong inroad on the plastic industry. Italy founded its own dye industry, as well as those of acetone and formaldehyde, during the past year.

Among the developments in the chemical industry which are of interest to our readers were: the foundation of the Carbon Black Export Association, Inc., representing 92% of the world's

(*Continued on page 119*)

Flexible Phonograph Records Perfected Involve Use of Novel Synthetic Resin

"Durium," a new infusible but flexible resin, retains characteristics of older materials, but combines others which open up a new range of molding possibilities

On Friday, January 3rd, the stage was sumptuously set and on it, a new synthetic resin, Durium, in the form of phonograph records, was introduced. Newspaper reporters were shown everything, from the correctly appointed, modernistically-decorated reception room to the containers in which the finished article is to to be distributed to the ultimate consumer. There was one very obvious and excusable exception. And that was, that the room in which the resin was prepared was very definitely barred and because some patent applications have not been granted as yet, all questions as to the chemical nature of the resin had to remain unanswered.

In its working properties, the resin shows two remarkable features. In an intermediate stage, it is quite brittle, but in the final thermo-set stage it is very elastic. And secondly, it is "molded", into phonograph records certainly, in the remarkably short time of ten seconds. Furthermore, it closely approximates the characteristic of shellac in so expanding under pressure that it accurately reproduces the finest line and crevice of the die.

Research work on the resin began only two and a half years ago at Columbia University under the direction of Dr. Hal T. Beans, professor of chemistry. With him were associated Dr. Louis P. Hammett and Dr. Geo. H. Walden, Jr., both of the Columbia faculty. As soon as technical details were perfected, a million dollar corporation was formed, equipment was installed for the production of 40,000,000 records annually and a novel scheme was evolved for distributing them directly to the consumer at a price of 15c a piece. Officers of the Durium Products Corp. are L. A. Van Patten, president; Arthur S. Jones, vice-president; G. L. Smith, treasurer, and F. C. Lowthorp, secretary.

Molding of Durium So Rapid It Is Practically Stamping

"Unlike other synthetic resins", explained Dr. Beans, in describing the material, "Durium hardens extremely quickly and can therefore be used in stamping operations, a great advance over the time consuming molding processes required to shape other compounds of this general type. For instance, phonograph records, and talking picture discs, which are pressed from metal dies, can be stamped in Durium at the speed of a printing press. I have pounded such a record with a hammer, then scratched it vigorously with a steel point and finally applied intense heat to its surface, all without causing any damage to the delicate, clear-cut impression.

"In appearance Durium is a clear golden substance, not unlike amber, with a highly polished brilliant surface, and is without taste or odor. When stamped it molds well and is capable of taking a very accurate impression. It is also heat resistant and can easily withstand the temperatures of molten lead and other metals. These two qualities make it ideal for molds or matrices in which metal can be cast, when great clearness and definition is required. I have several stereotype mats or matrices from which type and cuts have been cast, without in any way injuring the Durium.

"Durium in its liquid form can be applied as a spray paint or varnish and may also be used with the brush. Inasmuch as nearly all commercial shellacs and varnishes are combustible, it may be that the new material will be of great use where a fire resistant waterproof surface is desirable, for instance on the non-metallic parts of airplanes.

"When a new product is created in the laboratory, it is idle to speculate as to what its uses in industry may be. We know

The Durium Records, amber resin on red paper, with title and artists' name printed in gold letters, and the caption "Hit of the Week" in baby blue, directly on the cured resin.

that Durium possesses new combinations of qualities, and that needs exist for such combinations. Science has created the material. Industry will find out how to use it."

While various manufacturing processes will be affected by Durium, its first practical application will be made in connection with the amplifying of the present method of making phonograph records and sound picture discs. The new records will be as light as cardboard, flexible, more durable and easy to handle than the old type, and much cheaper.

The picture discs will be much more convenient and serviceable than the present heavy clumsy type. They will be much lighter in weight and will be far easier to handle both in transit and in actual use in theatres. Also they will be more durable.

The new phonograph records made of Durium can be marketed in an entirely new and novel way due to the fact that they are lighter in weight and unbreakable. They will be released weekly on news-stands and wherever else newspapers and magazines are to be found. They will be called "Hit of the Week" Records and will sell for 15 cents. The 52 most popular song hits of the year will be recorded.

High Quality of Recordings Assured By Jury of Showmen

Connected with this activity of Durium are three celebrated figures in the world of music, Eddie Cantor, Florenz Ziegfeld and Vincent Lopez, who have agreed to form a music jury to select the most popular song hit of each week for recording.

Durium will be particularly helpful in the manufacture of the large type of discs used in connection with talking motion pictures. The present type is so fragile that it is difficult to ship and there are large losses due to breakage. Durium will entirely eliminate this breakage.

Dr. Hal T. Beans, perfecter of Durium shows how the resin is resistant to impact. Durium records stand the blows of a hammer as long as the anvil does.

Record Production Process Is Not Complicated

The procedure for making phonograph records is relatively simple. The resin in varnish form is applied on one side of heavy kraft paper by means of rollers. The coated paper passes directly into a long drying chamber, moving quite slowly. When it emerges, it is tack-free and the resin has passed through the preliminary setting stage. It is then cut into sheets about 35 by 25 inches. They are then immediately passed to the presses which imprint the recording on the surface of the record. This is accomplished on mechanically-operated, gas heated platen presses, six records being imprinted at each operation, ten sheets per minute. The next step is a two-color printing 'Hit of the Week' in blue, and the title of the record together with the names of the recording artists in yellow, both right on the face of the record on the set resin. The last operation involves a guillotine which chops down the six finished records from the sheet.

The harsh handling to which the records are subjected during a demonstration of even their sound-reproducing qualities is pretty strong evidence that they were very durable. Such demonstrations are given in a room whose decorative scheme is in harmony with the outer offices. It is equipped with a double turntable, synchronized, phonograph having an electric pick-up. The record on one or the other revolving turntable may be connected with the loudspeaker. A commercial record is placed on one and the identical recording on a Durium disc is placed on the other turntable. The consensus of opinion is that there is practically little to choose between the two. However, the operator repeatedly would drag the needle across the grooves, thereby setting up a terrific howl in the loudspeaker, yet every time he placed the needle back in the groove, the tone was as mellow as the first time one heard it.

Following the manufacture of phonograph records Durium will be applied to many other industries.

Immediate Outlet For Water and Fire Roof Coatings

It is believed that Durium will find immediate use as a waterproofing and fire resistant coating, in certain types of molding where an extremely fine impression and quick hardening are necessary, in electrical insulation, in stereotype matrices and as a varnish where great durability and high lustre are important. Fabrics and paper or cardboard impregnated with Durium become stronger and are waterproof and highly fire resistant.

Buffalo Molded Section Meeting Agrees on Important Decision

IT was generally agreed among those present that the January meeting of the Molded Insulation Section of NEMA accomplished considerable. It was the best-attended meeting that the present molders' organization has enjoyed, several important non-member companies being represented for the first time. The meeting was called to order at 9.30 A. M. on Tuesday, January 14th, at the Hotel Statler in Buffalo, and the day's activities ended at 10 o'clock in the evening at the General Brock Hotel at Niagara Falls, Ontario.

Mr. Kurz, Chairman, first heard the report of Mr. Kempton, of the Nomenclature Committee, who wanted to know whether the Section wished the committee to continue with its efforts to seek a suitable generic name in face of the comment of various men in the industry, as reported in a recent issue of Plastics. The Section's wishes in this matter were that the committee continue with its work.

Member Accountants to Meet Nema Expert on Costs

By way of summing up the work done on cost accounting, it was agreed that the cost accountants of the various member companies meet with the accounting expert of NEMA some time after February 1st in New York for the purpose of establishing a uniform system of estimating costs and quotations. It was decided to invite to this meeting Mr. J. J. Quigley, who specializes in accounting in the molding industry, to aid in this work.

Mr. Frank Shaw presented, for the Uniform Contract committee, a mass of material from which various points for an acceptable uniform contract were to be selected. Upon the recommendation of Mr. Rossiter that prompt action was absolutely essential, the committee withdrew and after the luncheon recess presented a final draft for a uniform contract embodying all minimum requirements. The contract form as presented was acceptable to the representatives present but does not become operative until NEMA'S counsel as well as attorneys for the various companies pass upon the legal points involved.

General Welfare Discussed

The balance of the afternoon was taken up with various matters relating to the good and welfare of the custom molding industry. These touched on such subjects as the influence of radio and automotive production slumps on molding and the search for new and stable fields that might be entered for the sake of greater equalization of production throughout the year.

At five o'clock the entire body drove to the General Brock Hotel on the Canadian side of the Falls for dinner at the invitation of General Plastics, Inc., makers of Durez. The entire top story of the hotel was reserved. A large dining room, from which the lighted Falls could be seen, had tables set for forty-five people. At each place there was a printed souvenir program, containing the names of all the guests, a picture of Mr. Kurz and Mr. Schlesinger, chairman and secretary of the section, the menu, both liquid and solid, and a poem, dedicated to the assemblage, "The Molder Knows."

The companies, and their representatives, present at the business meeting were:

Diemoulding Production Co., Mr. Dew, Mr. Dunn.

Kurz- Kasch Co., Mr. Kurz, Mr. Kasch, Mr. Bauman.

Northern Industrial Chemical Co., Mr. Schlesinger, Mr. Fuller.

Shaw Insulator Co., Mr. Frank Shaw.

Chicago Molded Products Corp., Mr. Bachner.

Belden Mfg. Co., Mr. Stratton.

Garfield Mfg. Co., Mr. Walker.

Reynolds Spring Co., Mr. Rossiter, Mr. Austen.

General Electric Co., Mr. Randall.

American Insulator Corp., Mr. Huidekoper.

Boonton Moulding Co., Mr. Scribner.

Mack Molding Co., Mr. Kendall.

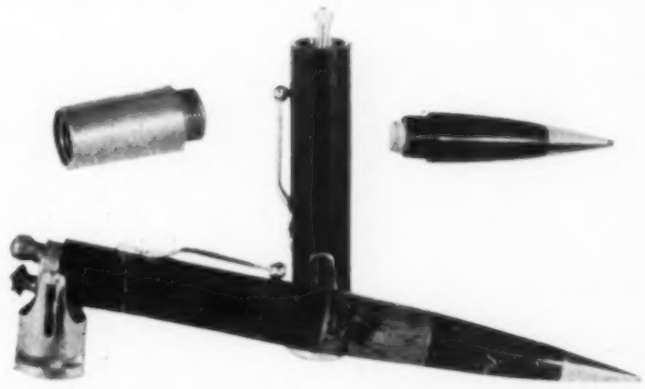
Boonton Rubber Co., Mr. Post.

Bryant Electric Co., Mr. Kempton.

Colt's Patent Fire Arms Mfg. Co., Mr. Stone, Mr. Conner.

Allen & Hills, Inc., Mr. Allen, Mr. Hills.

Norton Laboratories, Inc., Mr. Neal, Mr. Wilson, Mr. Whitwell.



Havalite, a combination lighter and mechanical pencil, combining the best features of both. Molded by Norton Laboratories out of black and colored Bakelite. The three parts are threaded so that the unit may be easily assembled.

How The British Plastic Industries Fared In 1929

Trade Association and organ, first retail store and expansion of light-colored molded products stand out in year's developments

By A. C. Blackall
British Correspondent

IN reviewing the progress of the plastic and molding trades of the United Kingdom in 1929 it will be advantageous to say a few words on the chemical industry generally, by way of preface. The outstanding general features of the industry last year were the increasing activity of the great German combine, the I. G. Farbenindustrie, in taking out British patents; the steady development of synthetic processes in the place of empirical methods of chemical manufacture; the production in Britain of new chemicals of prime industrial importance, including acetone, acetic acid, hydrochloric acid, methyl alcohol and butyl alcohol; the ever-increasing prosecution of industrial research; and the concentrated attention on the chemistry of coal.

The continued and increasing activity of Germany in chemical iuvention is shown by the fact that during the third quarter of 1929 the I. G. Farbenindustrie made 328 applications for British patents, as compared with 284 in the corresponding period of last year. The corresponding applications of the British combine, Imperial Chemical Industries, Ltd., for the two periods numbered 59 and 32.

Trade Association Established

Coming specifically to the plastics industry, an event of outstanding interest during the year was the formation of a Plastic Molding Trade Association to foster the technical interests of the concerns engaged in the trade. The functions and make-up of the organization are more fully described elsewhere in this issue.

The British plastics trade at last has an organ of its own, a monthly journal having started publication last June, and brings the country on equal terms with America, France, and Germany in the matter of a trade organ.

The paper has successfully passed through its early stages and has apparently gained the confidence of the industry. It was the proprietors of this publication who took the initial step towards the formation of the trade association.

Boom in the Phonograph Record Industry Has Passed

In July a reception was given by the Gramophone Co. (the English Victor Talking Machine Co.) at its huge factory at Hayes, to celebrate the 21st anniversary of the first pressing of "His Master's Voice" records for sale to the English public. The foundation stone of the factory was laid by Dame Nellie Melba in 1907. The output of the factory, which now employs 8,000 hands, was in 1908 about 700 records a week. Now it is nearly 500,000.

Another phonograph record company doing well is the Columbia Co. According to Lord Marks, the chairman, sales are still expanding virtually all over the globe and the firm's factories are being added to in order to keep pace with the enormous growth. At the London Radio Exposition last year the company introduced a combination phonograph and radio receiver which made a ready appeal to the public, and it recently announced three new models.

Many of the companies floated during the last year or two to manufacture unbreakable and pliable records appear to have faded out of existence, the only one heard of being the Goodson Co. This company encountered legal as well as technical difficulties in connection with its new flexible record, but these have at last been smoothed away and an extremely flexible and unbreakable record has been placed on the market to retail at the equivalent of 40 cents. Of the various new companies floated for the production of cheap shellac records, some have fared moderately well, but others have suffered more or less severe losses.

British Cyanides Co. Takes Part in Many Lines

The British Cyanides Co., Ltd., which controls Beetle Products, Ltd., held its annual meeting towards the end of the year, when Kenneth M. Chance, managing director, made interesting reference to the firm's progress. Mr. Chance said they were going steadily forward in all directions. In July the previous record of November, 1928, in sales of Beetle powder was substantially beaten, in September the increase over July was still more substantial, and in October sales showed an increase over the previous month of 2½ tons of white and translucent molding powders—a quantity which, translated into moldings, would probably represent some 15,000 to 20,000 articles. There are indications, too, that the usual January slackening of demand will be less acute in the New Year. The merits of the cheaper form of Beetle powder made with a woodmeal filler in dark colors are also now meeting

with more recognition. By its record Mr. Chance declared that Beetle Products, Ltd., had justified the action taken in purchasing the entire stock for the parent Co., British Cyanides Co., Ltd.

Beatl Store Prospers

The company's youngest child, Beatl Sales, Ltd., was responsible for the opening of the retail store in Regent Street, this step being taken in the full expectation that the shop would lose money for some time. The demand for Beatl tableware under each of the three brands, Bandalasta, M-L and Linga Longa, has been very great all through the year; in fact, the demand has temporarily been greater than the supply.

Apart from tableware the firm is laying down a set of molds at Streetly for house fittings and is also extending considerably the range of articles for personal use by both sexes. Some of the moldings are being made in France and possess the exquisite finish which the French alone seem able to impart.

In lacquers the firm has made great progress, and samples are now being tested by various firms in the lacquer trade. In tiles, the flanged tile developed some time ago did not prove entirely successful, as, although the adherence to the wall is sufficient an occasional tile shows signs of bulging in the center, probably because the moisture in the plaster evaporates and the vapor thus formed has sufficient pressure to create the bulge. The firm, however, received a trial order from America for a purpose for which it is believed the tile will prove suitable.

Resin-Plywood Tile Developed

A simpler and inexpensive form of tile has now been developed by cementing a thin sheet of Beatl on to plywood. Samples have been subjected to very severe tests, so severe that the plywood layers have become loosened, but so far in no instance, either in hot or cold water or steam, has there been any sign of the Beatl sheet being loosened from the plywood backing. This tile will shortly be placed on the market, and a stand has been taken at the 1930 Ideal Home Exposition for the display of a room tiled and panelled with Beatl and with examples of the way in which Beatl can be used to beautify furniture.

In America the firm came to an agreement with the American Cyanamid Co. for the formation of Synthetic Plastics Co. Mr. Chance praised the new Beetle factory in New Jersey as a fine establishment.

Kelacoma Powders Mixed Ready for Molding in Dry Form

A new British molding material which made its debut during the year and seemingly has a great future is known as Kelacoma. The makers claim that it fills the protracted demand of molders for a powder possessing strict uniformity, color, quality, flow in productive yield, and economy. This material is cheap enough to ignore Continental competition and has many of the best qualities of its more costly rivals.

It is a new Urea compound. However, instead of the many processes required when forming condensation products with aqueous formaldehyde, solid polymers of the aldehyde combined with a certain proportion of a phenolic resin are used, and it is possible to combine the required chemicals, fillers, and pigments in a dry state, thus eliminating many of the difficulties that occurred when using preliminary condensate gel solutions. Kelacoma moldings possess great mechanical strength, will not soften in water, and are impervious to the effects of most chemicals. An important advantage is their great uniformity in color and the certainty of good "pulls" with a minimum of waste. The powder is easily pelleted and has good flowing qualities. Beautiful transparent, semi-transparent and mottled effects are easily obtainable.

Fabric Base Material Adopted by British Molders

Two important American products appeared on the British market during the year—lithene and formite. Lithene, which is non-inflammable, non-hygroscopic, unwarpable, and practically unbreakable, is actually a British invention, but was first exploited in America. It will be used in England for the electrical, auto and fancy goods trades. Formite has been introduced by Bakelite, Ltd., and embodies a flaked fabric filler in place of wood flour and asbestos, thus giving it greater shock resistance.

The safety glass manufacturing industry in Britain is still a comparatively new one and it has not yet emerged from its teething troubles, which, unhappily have been more than ordinarily numerous lately. Its difficulties can in the main be attributed to two causes. The success of the first company in the field (Triplex Safety Glass Co., Ltd.) and its obviously good prospects for the future, attracted other ventures, which invited the public to subscribe capital in many instances before their processes were perfected. Their haste was largely due to the second cause, the stock exchange boom of 1928, when the public showed eagerness to subscribe capital for the exploitation of nearly every new process that appeared. The upshot was that many competitive concerns came into being before their processes were properly developed and perfected, and the established firm was forced to increase production more rapidly than was possible on an economically sound basis. Profits, therefore, have been either non-existent or disappointing. The Triplex Co., however, has had a successful history since it was made a public company in 1925.

Colored Casein Buttons Can Now Be Produced Quickly From White Stocks

Changes in composition and refinement of automatic machines permits casein to further compete with vegetable ivory

By P. Ch. Christensen

President, Aladdinite Co.

SEVERAL new manufacturing features have been added to the casein button industry in addition to the regular feature of rods and sheets, in plain and mottled colors. These specified shades are generally meant to match a particular garment in its season. Production in the past, has also centered about certain standard colors which have been made year after year. This has been common procedure for some time past and has met with dominant success in Germany, England, other European countries, as well as in the United States. Casein buttons so made and designed, as to color, have replaced ivory buttons to a considerable degree. The outstanding development in the casein button industry is the comparatively new feature of being able to dye white stock casein buttons in a manner similar to the dyeing of white ivory buttons.

Porosity of Ivory Is the Basis of Affinity for Dyestuffs

The real secret of the success of the ivory button industry is that it is a white material which has a great affinity for dyestuffs of all colors, due to its porous fibre structure. This property enables the manufacturer to store up large quantities of white buttons of all sizes from which to draw on when orders are placed for various colors. The dyeing is carried out after color is specified, requires only a few days, and are then polished afterwards, before ready for delivery. This quicker method permitted the ivory button manufacturer to give his

Mr. Christensen, a former co-worker with Thos. A. Edison, is one of the pioneers in the American casein plastic industry.

customers very quick service in any special mottle shade desired. This tended to exclude any other material, casein included, from reaping big orders in the button field.

This situation, to my mind, has been radically altered as it is possible to do the identical thing with white casein. In fact, even better and more economically, as it is a much simpler technique from the beginning through the finishing operations. It is now quite possible to produce a casein rod or sheet of such porous and fibrous structure that it will take dyes with even greater ease than the ivory.

It has not been so difficult to take lighter colors, for instance green, brown, blue, red and grey, in casein stock, and dye them darker or make them into a good black, or to take white and dye it into delicate shades in plain colors. But by the accomplishment of an expert dyer of many years experience, it is now possible to dye the white casein stock, into every conceivable mottle color matching every ivory button shade so closely that indeed one cannot tell the difference.

Improved Cutting Machines Will Be Final Blow To Ivory

With such an important feature controlled, casein stock is placed on an even basis with ivory as far as white stock and dyeing is concerned, so that delivery to customers can be made in an equally quick time.

Our associate, Mr. E. Clemens, a mechanical engineer of considerable ingenuity, and who has been identified with the casein and ivory button industries both here and in Canada for twenty-five years, has designed and built a number of automatic casein button cutting machines. These machines are particularly adaptable for producing buttons of this porous casein material to be subsequently dyed. It is my opinion that the casein button industry will be greatly enhanced by way of mass production at low cost by virtue of this machine.

It was profound pleasure to hear Mr. Clemens announce his desire to turn his mechanical ingenuity to automatic machines for casein buttons. He also said that the above mentioned feature of having the white stock ready on equal basis with ivory for coloring was not all that can be said in favor of casein over ivory. He stated that the easy method of turn-

(*Continued on page 121*)

NEWS *of the* INDUSTRY

Conn. Molded Now Part of Monowatt

THE Monowatt Electric Corporation now includes the plants and business of the former Connecticut Molded Products Corporation and the New England Metal Products Company, both of Meriden, Conn., in addition to its factory at Bridgeport. This means ownership, and operation and control of a metal stamping plant and a plant which specializes in the manufacture of molded insulation parts. This consolidation cuts overhead and increases production efficiency. The Monowatt Electric Corporation is prepared to co-operate with manufacturers who require metal stampings, molded insulation products or an assembly of the two. The company maintains offices in New York and Chicago.

Molded Products at the Auto Show

THE 1930 Automobile Show presented few visible signs of new applications of molded parts. New styles were evident in steering wheel column attachments, notably in the Hudson. All models of this car had the interiors finished in a modernistic style, a silver-gray color predominating. The molded horn, spark, gas and other controls, mounted on the column, were in smart contrast with their shiny, black geometric outlines. A surprisingly generous number of new models have abandoned the molded gear shift lever knob and have substituted either glass or enamelled metal knobs. The much-mentioned molded panelling and frame-work were not yet to be seen.

The new Packard completes its decorative scheme with the use of ivory and colored Catalin.

British Molders Hold Second Meeting

THE second meeting of the newly -formed British Plastic Molding Trade Association has recently been held in London, Captain Barber occupying the chair. In his address the chairman referred to the findings of the provisional committee appointed for the purpose of drafting provisional suggestions for the association, and to the report it has issued. The committee has endeavored to ascertain if it is possible to have one common platform covering all branches of the trade and it is

Dr. Redman Speaks Before 125 at Bakelite Research Club Dinner

BAKELITE Research Club, organized five years ago, by members of the Bloomfield Division of Bakelite Corporation, held their annual dinner and dance Saturday, December 14th, at the Caldwell Woman's Club. Guests were present from the Perth Amboy Division and from the main office, which is in New York.

About one hundred and twenty were present at the dinner and dance at which Mr. C. L. Chamberlain, Works manager at Bloomfield, was toastmaster. The principal speaker was Dr. L. V. Redman, Vice President of the company and Director of Research and Development. Doctor Redman's subject was "The Time Factor and Achievement in Research". Mr. V. E. Meharg, President of the club, greeted the members and their guests. Following the dinner, dancing was enjoyed until midnight with music furnished by the Wilson orchestra. Entertainment included readings by Mrs. E. R. Hanson, musical numbers by Miss Grace Robinson and Ernest Smith, a comedy skit by Gene Williamson, and a series of numbers by the Ruth Wilson dancers. Mrs. L. V. Redman was assisted in receiving by Mrs. A. J. Weith, Mrs. T. S. Taylor, Mrs. G. S. Weith, and Mrs. C. A. Nash. The general committee in charge included Dr. John H. Schmidt, R. P. Courtney, John F. O'Neil, R. S. Daniels, Dr. H. L. Bender, and H. E. Riley.

KURZ-KASCH

Plastic Moulding Headquarters

Are specialists in the moulding of articles out of the new light-colored materials

BEETLE and LUMARITH

We are one of the four exclusive moulders selected by the Synthetic Plastics Co., an American Cynamid Co., subsidiary, equipped to mould their powder.

Plant and
Executive Office,
DAYTON, OHIO

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Dayton, Ohio

MOULDERS OF PLASTICS

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of the opinion that membership shall be restricted to molders, manufacturers of molding powders and molding materials as supplied to molders, mold makers and molding plant manufacturers. Apart from the casein side of the industry the committee feels that in the sections named there is sufficient common ground to cover the aims and objects of the other sections of the industry.

The chairman pointed out that, so far as molders were concerned, the suppliers of raw materials were the powder makers, and that if other chemical and sundry manufacturers were admitted it would no longer be an association of the molding trade. The committee has fully discussed the question of associate membership for such firms, but has decided that, as the molders are mainly concerned, if there were many associate sections on the council, the molders would be over-ruled by them.

Associated Lines Admitted

After some discussion it was decided that the formation of the association should be along the lines recommended by the committee, as amended at the meeting. The amendment admits casein, celluloid, and allied material manufacturers.

It was decided that the objects of the association would be to foster and protect the molding and allied industries of the United Kingdom, to take steps to ensure the highest possible standard of work being produced by those industries, and to further effect standardization in those phases of the industries where such standard-

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ization would be an advantage. The association is to be open to British manufacturers only, but the council is empowered to admit at its discretion to membership a concern or individual not included in the category of molders, manufacturers of molding powders and materials as supplied to molders, mold makers and molding plant manufacturers, and casein, celluloid and allied materials.

The council is to consist of at least 12 members, constituted as follows: 7 molders, 3 powder makers, and 2 representatives from the machinery, casein and allied trades. The provisional committee is to continue in office until the Registration of the association is complete.

Plastics Trade Review

(*Continued from page 106*)

carbon black output; the American Cyanamid Company's purchase of the Calco Chemical Company; the foundation of the American I. G. in April; the purchase of John C. Wiarda & Co. by the Kalbflaish Corporation; the foundation of the General Industrial Alcohol Corporation; the taking over of Kalbfleisch by Cyanamid; the U. S. Industrial Alcohol-Kentucky alcohol merger; the Newport and Rhodia combine; the incorporation of Solvents Institute; the American Cyanamid-Selden and Calco-May acquisitions; the 400% stock dividend of Dow Chemical Co.; the American Commercial Alcohol's purchase of Kessler; Commercial Solvents acquiring Commercial Pigments; deaths—Dr. E. E. Slauson, author of "Creative Chemistry", and Adolf Meister, of Garfield Manufacturing Company; Monsanto Chemical-Merrimac, Cyanamid-American Powder and Newport Chemical-Acetol Products Cor-

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Chemical Companies' entrance into synthetic camphor field; foundation of United Tung Oil Corporation.

Pyroxylin Industry Increases Business

Perhaps the keynote of the pyroxylin industry during 1929 was one of style. Especially was this true in all toilet articles manufactured. Much time and money was spent in keying these articles up to the modern demand, especially with an eye to the feminine market. This was undoubtedly one of the major factors in the increases shown in toiletware sales for the year, since it is estimated that the business exceeded the previous year's by something like 18%. The whole pyroxylin industry recorded progress, and was generally much better then any preceeding year; anywhere from 12% to 22% better, in fact. Fabricators of pyroxylin had a normal growth, unaffected for the most part by financial slumps, and at the close of the year approximately the same number of them were still in business, showing a low mortality rate. Through the use of national advertising similar to Church seats and Graham-Paige automobiles, the pyroxylin industry was greatly aided, since both these companies featured application of material to the advantage of the ultimate consumer. Safety glass, Graham-Paige's talking point, developed normally well during the year, since Ford's excursions to foreign markets affected only his own products. The Christmas Trade period saw about 4% rise in sales of all pyroxylin articles, which should be distinctly encouraging as an indicator of the basic utility of this product.

With the exception of the start of a new du Pont plant at Leominister, little new building was done in the industry. J. F. Walsh was elected Vice President of the Celluloid Corporation who also changed the name of their toiletware division to Amerith, Inc. C. K. Davis re-

placed F. K. Davis as President of du Pont Viscoloid, and A. E. Pitcher succeeded W. A. Joslyn as Executive Vice President who was in turn promoted to Director of Sales. C. H. Leach was made Sales Manager, J. M. Mack Chicago District Manager.

The outlook for 1930 is extremely hopeful. New applications, increased use of film and safety glass, new styles and methods—even, Congress willing, the tariff—should help the industry tremendously.

Molders' Meeting

(*Continued from page 111*)

Recto Mfg. Co., Mr. Backscheider.

Scranton Button Co., Mr. Sylvester.

Schneider Bros., Mr. G. Schneider, Mr. Hornbeck.

Arrow Electric Co., Mr. Carlson.

Monowatt Electric Corp., Mr. Groten.

Alden Mfg. Co., Mr. Alden.

Plastics Publications, Mr. Gilmore, Mr. Klein.

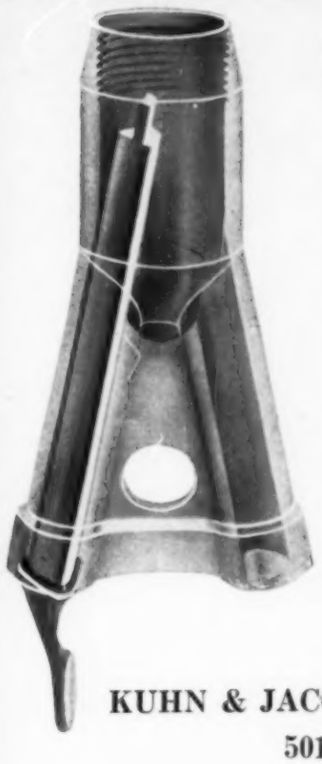
NEMA, Mr. Clarkson.

Also present at the dinner at the General Brock Hotel were Mr. Swan, Mr. Gordon Brown, Mr. Carlson and Mr. Hoey of the Bakelite Corp., and Mr. Dent, Mr. Spencer, Mr. Ryan, Mr. Hanmer and Mr. Dodd of General Plastics, Inc.

Colored Casein Buttons

(*Continued from page 116*)

ing buttons from casein rods, which are even and uniform, in one operation, on the simple machines now in use (and which Mr. Clemens has already seen a way to improve) would prove a tremendous saving in labor and material compared to the two operations of sawing and turning of the irregular shaped nuts; having to cut up the nuts for a certain size which you need, and store the other parts away for the future. He contends this is a great disadvantage and will help to further the casein button materially over the ivory.



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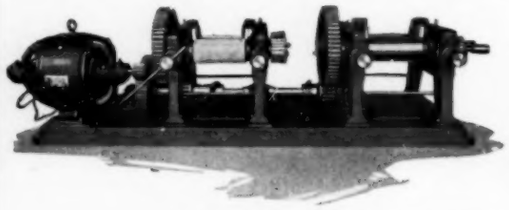

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This is a carefully classified index of concerns who specialize in this industry and who advertise regularly in PLASTICS. Please mention PLASTICS when writing to these firms.

And Now, In Closing:

IT is distinctly encouraging to discover articles and items in contemporary periodicals dealing with the rapid growth of plastic materials. Publicity through intelligent media can do a great deal toward a further education of buyers. After all, the somewhat chaotic condition of one or two branches of the industry is only a natural experience that countless other industries have experienced in the process of formation. The industry of plastics is basically sound and constantly growing, and it is hopeful indeed to have its progress reported other than on our own pages.

—o—

WE take occasion, in connection with the foregoing, to reprint here a paragraph from a short editorial appearing in the January issue of Chemical & Metallurgical Engineering. It composes some admirably expressed standards, and we are only too glad to present it now for the attention of our audience.

"Pursuing these recent trends again, one is ultimately confronted by the rather elementary lesson that the plastics are not strictly competitive; that each material has some unique superiority which can be most profitably exploited. With the field then "wide open," the net outcome should be not a tug of war but a tandem. It will require all available types of plastics to satisfy the variegated demands for special properties, special colors and, where these are not desired, special prices. Frowning on newcomers who are decoyed by expired patents seems superfluous under present conditions; they either will "soon find out for themselves" or, if really technically capable, will aid in the generally upward swing. The most salutary advice for them, and, in passing, for the rejuvenated older producers too, would be to develop their product along the lines of its special promise and usefulness. By expending intelligent energy to this end, they will all derive gratifying returns from what promises to be, as a supplement to our era of metals, a true "Plastic Age."

—o—

NOT all of the publicity, however, is advantageous. Some of the publications, particularly the financial and news papers, have bordered on the ridiculous in attempting to air their knowledge. Many times certain misinformation is deliberately supplied to these organs by overharassed chemists who make some statement merely to avoid further questions. This policy is decidedly harmful to progress, since it inculcates fantastic notions in the minds of the public. After all, men who make plastic materials possible are not magicians. They are, on the whole, representative business men extremely busy with their own business,—that of applying chemical knowledge.

—o—

IT is with various emotions, therefore, that we look forward to reading the reported exhaustive article in one of the first issues of a new publication that is to be launched shortly among the elite by the originators of an established weekly. We will inform the parish of its success or failure—as soon as possible.

—o—

WE are in receipt of several letters and photographs that, we are frank to admit, are very embarrassing to us. We had planned to include them with our annual survey this month, and only lack of available space prevented us from doing so. We did, however, incorporate the principal features of each into the body of our article, and we trust we shall be forgiven for not doing as we had originally planned. Many times one of our editors has almost quit on us because he didn't have enough space to fill, and we really have meant to do something about it. However, this present case makes us realize that something will have to be done shortly. We won't promise, but we believe that March will see a change of pace.

—o—

WE observe that several new molding materials are to come on the market this year. In fact we are willing to let that observation ride as a prediction. We might also be bold enough to predict some other things, as follows:

(1) A higher mortality rate of molding plants.
(2) A higher birth rate of molding plants the first six months.
(3) Increased demand for some price:supply synchronization.
(4) A loud yell about pyroxylin tariff.
(5) A brisk chain store distribution.
(6) A slack and dangerous tube base market.

And don't tell us we're wrong until the year is over.

And Then, in March:

A new editorial service will be offered in regard to marketing, written by one of the well known authorities on economic distribution. It will be of great importance to every branch of the industry, since it will deal with materials as well as articles; people as well as methods.